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AIRPORT AND AIRWAY IMPROVEMENT AMENDMENTS OF 1987

JUNE 3, 1987.—Ordered to be printed

Mr. ROE, from the Committee on Science, Space, and Technology, submitted the following

REPORT

[To accompany H.R. 2310 which on May 7, 1987, was referred jointly to the Committee on Public Works and Transportation, and the Committee on Science, Space, and Technology]

[Including cost estimate of the Congressional Budget Office]

The Committee on Science, Space, and Technology, to whom was referred the bill (H.R. 2310) to amend the Airport and Airway Improvement Act of 1982 for the purpose of extending the authorization of appropriations for airport and airway improvements, and for other purposes, having considered the same, report favorably thereon with an amendment and recommend that the bill as amended do pass.

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H703-7.

The amendment (stated in terms of the page and line numbers of the introduced bill) is as follows:

Page 4, strike out line 15 and all that follows through line 10 on page 6 and insert in lieu thereof the following:

(b) RESEARCH, ENGINEERING AND DEVELOPMENT, AND DEMONSTRATIONS.—

(1) IN GENERAL.—Section 506(b) is amended to read as follows:

"(b) RESEARCH, ENGINEERING AND DEVELOPMENT, AND DEMONSTRATIONS.—

"(1) DEMONSTRATION PROJECTS.—The Secretary is authorized to carry out under section 312 of the Federal Aviation Act of 1958 (49 U.S.C. App. 1353) such demonstration projects as the Secretary determines necessary in connection with research and development activities under such section.

"(2) GENERAL AUTHORIZATION.—For research, engineering and development, and demonstration projects and activities under section 312 of the Federal Aviation Act of 1958 and paragraph (1) of this subsection, there is authorized to be appropriated from the Trust Fund—

"(A) for fiscal year 1988—

"(i) $127,192,000 solely for air traffic control projects and activities;

"(ii) $7,743,000 solely for air traffic control advanced computer projects and activities;

"(iii) $9,818,000 solely for navigation projects and activities;

"(iv) $21,957,000 solely for aviation weather projects and activities;

"(v) $6,307,000 solely for aviation medicine projects and activities;

"(vi) $24,988,000 solely for aircraft safety projects and activities; and

"(vii) $3,000,000 solely for environmental projects and activities; and

"(B) for fiscal year 1989—

"(i) $135,866,000 solely for air traffic control projects and activities;

"(ii) $15,716,000 solely for air traffic control advanced computer projects and activities;

"(iii) $11,395,000 solely for navigation projects and activities;

"(iv) $21,797,000 solely for aviation weather projects and activities;

"(v) $6,613,000 solely for aviation medicine projects and activities;

"(vi) $21,013,000 solely for aircraft safety projects and activities; and

"(vii) $2,600,000 solely for environmental projects and activities.

"(3) AUTHORITY TO TRANSFER FUNDS.—

"(A) UNLIMITED.—Funds may be transferred among the projects and activities listed in paragraph (2), except that the net funds transferred to or from any category of such projects and activities listed in paragraph (2) in any fiscal year may not exceed 10 percent of the amount authorized for such category by paragraph (2) for such fiscal year.

"(B) AFTER NOTICE.—In addition, the Secretary may propose transfers to or from any category of projects and activities listed in paragraph (2) exceeding 10 percent of the amount authorized for such category. An explanation of the proposed transfer must be transmitted in writing to the Committee on Science, Space, and Technology and the Committee on Appropriations of the House of Representatives and the Committee on Commerce, Science, and Transportation and the Committee on Appropriations of the Senate. The proposed transfer may be made only when—

"(i) 30 calendar days have passed after transmission of such explanation; or

"(ii) each such Committee has transmitted to the Secretary written notice that such Committee has no objection to the proposed transfer.

"(4) MINIMUM EXPENDITURES FOR ENHANCING AIRPORT CAPACITY.—

"(A) GENERAL RULE.—Notwithstanding any other provision of this subsection, of funds made available under paragraph (2) in each of fiscal years 1988 and 1989, not less than $25,000,000 per fiscal year shall be expended for research and development on preserving and enhancing airport capacity (including research and development on improvements to airport design standards, airport maintenance, airport safety, airport operations, and airport environmental concerns) under section 312 of the Federal Aviation Act of 1958.

"(B) REPORT.—Not later than 60 days after the last day of each of fiscal years 1988 and 1989, the Administrator of the Federal Aviation Administration shall transmit to the Committee on Science, Space, and Technology and the Committee on Public Works and Transportation of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report demonstrating that the Administrator has complied with subparagraph (A) in such fiscal year.

"(5) PERIOD OF AVAILABILITY.—Amounts appropriated under this subsection shall remain available until expended.".

(2) EFFECTIVE DATE.—The amendment made by paragraph (1) shall take effect October 1, 1987.

I. PURPOSE OF THE BILL

The purpose of the bill is to authorize appropriations from the Airport and Airway Trust Fund to the Federal Aviation Administration for research and development for fiscal years 1988 and 1989 as follows:

	Fiscal year	
	1988	1989
Air traffic control	$127,192,000	$135,866,000
Advanced computer	7,743,000	15,716,000
Navigation	9,818,000	11,395,000
Aviation weather	21,957,000	21,797,000
Aviation medicine	6,307,000	6,613,000
Aircraft safety	24,988,000	21,013,000
Environment	3,000,000	2,600,000
Total	201,005,000	215,000,000

II. COMMITTEE ACTIONS

RESEARCH, ENGINEERING AND DEVELOPMENT

The Airport Airway Improvement Act of 1982 ended its five year authorization with Fiscal Year 1987. The Committee believes that a two-year authorization will more reliably reflect the predictable requirements of FAA R, E&D and therefore recommends that the Airport and Airway Act R, E&D authorization be extended for a two-year period.

The FAA requested a total of $150,000,000 for Research, Engineering and Development for Fiscal Years 1988 and 1989. The Committee believes these requests inadequate to the task at hand and recommends an authorization of $201,005,000 for Fiscal Year 1988 and $215,000,000 for Fiscal Year 1989.

The major portion of the FAA's requested funds are for front-end development costs to support the National Airspace System (NAS) Plan which started in 1982 as a response to H.Res 202, to develop and implement a long-range program to modernize and increase the capacity and reliability of the enroute and terminal ATC system through advanced technology. The bulk of the NAS Plan has passed the research and technology development stage and is beyond the Committee's jurisdiction except for a sustaining effort for the plan that is reflecting in the Administration's request.

The $150,000,000 annual levels for 1988 and 1989 are only about 70% of previous forecasts of the need for these years. In spite of an increasing unspent balance in the Trust Fund (some $9 billion), budgetary constraints of the last several years have caused the postponement or elimination of many advanced concept studies. This year's request further delays several advanced research needs. The Committee feels that to abandon the advanced research necessary to sustain the growth afforded by the NAS plan and for the requirements of the post-NAS-Plan period would be tantamount to legislating a future crisis in the ability of the ATC system to meet 21st century requirements.

The Committee recommends an augmentation of $51.005 million to be applied as follows: (1) separation standards, advanced navigation, user preferred trajectories, dynamic use airspace, oceanic traffic management, low altitude surveillance, NAS development studies, advanced concepts, AERA 3, advanced traffic management systems, terminal ATC automation, automatic dependent surveillance [$9.244 million]; (2) beacon surveillance enhancements [$2.7 million]; (3) communications data link, rotorcraft communications, future communications regulation and architecture, VSCS [$13.872 million]; (4) airport safety support, planning, all-weather taxi guidance, surface visual control, aircraft takeoff/landing advances [$1.5 million]; (5) flight service station enhancements [$.6 million]; (6) terminal tower control experimentation and development [$1.6 million]; (7) controller human factors, satellite technology, voice data entry, CADM flow management and ATC techniques, advanced wind shear sensor development [$5.056 million]; (8) rotorcraft support, SBIR [$3.646 million]; (9) navigation systems engineering, utilization of civil GPS, helicopter IFR operational evaluation, navigation enhancements [$2.4 million]; (10) flight crew human factors, precision approach engineering [$.758 million]; (11) weather research, centralized Wx info processing, low level wind shear detection, advanced weather devices and sensors, weather sensor enhancements [$3.251 million]; (12) aviation medicine R&D [$2.015 million]; (13) cabin fire safety, regulatory support, propulsion, transport/helicopter crashworthiness, flight safety [$3.550 million]. Of the amount added for Aircraft Safety ($3.55 million), $1.2 million is authorized for increased research in fire safety studies. The increase in research is being directed toward studies of new fire resistant materials used in aircraft interiors and for studies to reduce the toxicity of smoke resulting from interior aircraft fires; (14) environment and noise reduction [$.813 million].

The total authorization for Fiscal Year 1988 is $201,005,000; for Fiscal Year 1989, $215,000,000.

III. COMMITTEE VIEWS

Civil Aeromedical Institute

The Civil Aeromedical Institution (CAMI) at the Mike Monroney Aeronautical Center is charged with research activities that promote civil aviation safety and the health, safety and efficiency of FAA employees. These activities include the role of the human operator in the air traffic control system; the efficiency, performance and work environment of airmen; the safety and health of pilots and aircrew; and the safety of passengers and ground personnel. CAMI has four program elements including Aeromedical Program Support (such as toxicology support for accident investigation for the National Transportation Safety Board and the Federal Railroad Administration), Protection and Survival, Work Force Optimization Research (Analytical), and Human Performance Research.

In the Committee's view, an inordinate amount of emphasis has been placed on CAMI's analytical research associated with designing tests for use in selecting air traffic control specialists and air safety inspectors and for use in screening during training. While Work Force Optimization Research is critical to ensure that only qualified personnel are assigned to ATC and ASI positions, the Institute is being underutilized in terms of its facility and personnel in the areas of Human Performance Research and Protection and Survival Research. Therefore, the Committee requests that the Administrator evaluate potential roles of the Institute in aeromedical research and investigate the possibilities of expanding its activities with respect to Human Performance Research including assessments of pilot/controller errors and stresses, and Protection and Survival Research including work on seat and restraint systems crashworthiness, emergency escape and survival, and fire and smoke toxicity. The committee requests that the Administrator report his findings to the Committee no later than January 1, 1988.

NOISE ABATEMENT RESEARCH

Of the funds authorized for Environmental Programs, no less than $2,000,000 is earmarked for research in Aircraft Noise Reduction and Control. The research shall examine new and innovative technologies, in cooperation with other agencies including NASA, to control noise generated by aircraft and in the development of effective noise abatement operating procedures. Specifically, the research should investigate noise abatement for airports that have a high density of private residences and educational and medical facilities in close proximity. The innovative noise abatement research should also include effective noise insulation of private residences.

IV. RESEARCH, ENGINEERING AND DEVELOPMENT SUMMARY

PROGRAM AND PERFORMANCE

The Federal Aviation Administration (FAA) conducts engineering and development programs to improve the national air traffic control system and to increase its safety, productivity, and capacity to meet the expected air traffic demands of the future. The agency also administers aviation medical research aimed at increasing the personal effectiveness of air traffic controllers and the safety of aircrewmembers.

These programs are conducted by the agency's technical personnel, and through contracts with qualified private firms, universities, individuals and other Government agencies.

1. Air traffic control.—Existing technology is applied to air traffic control problems to keep the current system operating safely and system improvements are made to increase the productivity and capacity of the current system. These improvements include the development and implementation of a collision avoidance capability which operates independently of the ATC system and development of a communications switching system for improved voice communications between controllers within an ATC facility, between controllers at adjacent facilities, and between controllers and pilots over air-ground radio outlets and the applications development for providing data link air/ground services.

This program also includes activities designed to insure that the air traffic control system will satisfy the demands of the 1990's, particularly those affecting the interface between pilots and traffic controllers. This work includes developing new traffic control system features and concepts; assessing their technical, economic, and operational feasibility and conducting selected feasibility demonstrations.

2. Advanced computer.—This activity modernizes the air traffic control system by providing for an advanced automation system to accommodate the demand for air traffic services forecasted for the post-1990's. Program efforts include design, development, and testing of an advanced automation system.

3. Navigation.—This activity provides for modernization, expansion, and improvement for the common navigation system facilities. The requested funds will support research and development activities for en route navigation to assess and develop standards for candidate navigation systems for use in the post-1995 period.

4. Aviation weather.—This activity provides for a program, coordinated with the Departments of Defense and Commerce, to modernize the acquisition, processing, dissemination, and display of weather information tailored to the needs of aviation users. Development of weather radars and weather processors, and research into hazardous weather phenomena in terminal areas will be emphasized.

5. Aviation medicine.—Aeromedical research is directed toward identifying and eliminating those physiological and psychological factors harmful to personnel engaged in operating the traffic control system or which may jeopardize flight safety.

6. Aircraft safety.—This activity covers the research work in support of developing improved regulations to promote flight safety of civil aircraft. Development of systems and devices to prevent and deter sabotage in the civil air transportation system will also continue. Funds requested will continue research in fire safety, including cabin fires, and will continue research in air transport, general aviation, and flight safety.

7. Environment.—Principal efforts under this activity are the development of data to support rulemaking and to minimize the undesired environmental effects on the public attributable to the air transportation system. Research will continue into air pollution and noise control, primarily associated with certification and enforcement requirements.

General Statement

The Research, Engineering and Development program is comprised of seven major activities: (1) Air Traffic Control, (2) Advanced Computer (3) Navigation, (4) Aviation Weather, (5) Aviation Medicine, (6) Aircraft Safety, and (7) Environment. The objectives of this program are to keep the current system operating safely and efficiently; to modernize the system through improvements in facilities, equipment, techniques, regulations and procedures, and to insure that the system will safely and efficiently handle the volume of aircraft traffic expected to materialize in the future.

The realization of these objectives requires that the development of future navigation and traffic control equipment begin with the exploitation of current technology. This includes high-speed modular computers, solid state electronics, digital communications, and satellite applications. Some of these technologies will be used or further developed in FY 1988 programs, including development of advanced computers, automated en route air traffic control, and other new and enhanced automated aids for air traffic control.

The justification is presented in a format which includes an appropriation history for each program dating back to 1982 and projecting costs thru 1992. The aggregate costs beyond 1988 are shown for planning purposes and do not necessarily constitute the outyear budget estimates.

General Justification

The Committee authorized a total of $201,005,000 for fiscal year 1988 and $215,000,000 for fiscal year 1989 as shown in the following table:

	Budget authority	
	1988	1989
Air Traffic Control	$127,192,000	$135,866,000
Advanced Computer	7,743,000	15,716,000
Navigation	9,818,000	11,395,000
Aviation Weather	21,957,000	21,797,000
Aviation Medicine	6,307,000	6,613,000
Aircraft Safety	24,988,000	21,013,000
Environment	3,000,000	2,600,000
Total	201,005,000	215,000,000

This request reflects domestic and international requirements to make air travel safer and to increase the efficiency of the Air Traffic Control (ATC) system. The projects included under this appropriation request are consistent with the National Airspace System Plan. The major thrust of the FY 1988 budget request is directed toward: providing the development of a new automation system necessary to meet the demand for air traffic control services in the late 1980's and beyond; continuation of the TCAS II prototype evaluation and limited implementation program; modernizing communications systems; developing a national aviation data link standard for providing aviation related services to inflight aircraft; developing radars for the detection and tracking of severe weather; and formulating and analyzing concepts for future traffic control systems. This request also includes funds required for: aircraft safety, including fire safety, transport and general aviation safety, and expedited research into explosive and weapon detection; minimization of environmental consequences as a result of aviation; and research into biomedical factors related to aircraft accidents, injuries and fatalities, and research into the optimization of factors related to selection, training, retention, and performance of air traffic controllers as well as to understand the human performance process in cockpits.

The financial resources needed in fiscal year 1988 to meet these major commitments and other future needs include the following: development of advanced computer systems—$7.7 million; continued development of the Traffic Alert and Collision Avoidance System (TCAS)—$3.0 million; airborne windshear detection and avoidance, continued evaluation of approach and landing systems—$3.3 million; systems engineering validation of technical, economic and operational requirements for future traffic control systems and formulating and analyzing concepts for future traffic control systems—$34.5 million; improving the design and layout of airports and construction of runways—$6.4 million; improving the acquisition, distribution, and display of weather data—$21.9 million; evaluation of navigation systems for possible future replacement of the present Very High Frequency Omnidirectional Radio Range/Distance Measuring Equipment (VOR/DME) air navigation systems—$6.5 million; continued development of the Voice Switching and Control System, the air/ground transfer of digital data through a data link capability, and enhancements to the National Airspace Data Interchange Network that provides for the transfer of digital data between ground facilities to meet existing and future communications needs—$57.4 million; medical research programs—$6.3 million; aircraft safety—$25 million; and environmental efforts—$3.0 million.

The personnel financed under this appropriation are located at the Federal Aviation Administration Technical Center, Atlantic City, New Jersey; the Mike Monroney Aeronautical Center, Oklahoma City, Oklahoma; and the Washington, D.C. offices of the Federal Aviation Administration (FAA). These personnel fall under three general categories: Program Supervision and Contract Management, Test and Evaluation, and Aeromedical Research.

Program Supervision and Contract Management

These personnel are responsible for technical direction and program management. They are directly concerned with the complex program to develop and modernize complete systems (or components of systems) as well as to develop future systems to increase the capacity of the nation's airport and airway systems. The primary function of personnel under this category is to manage major technical efforts falling within their area of technical expertise.

Other areas of work requires the technical expertise of air traffic controllers, computer system analysts, operations research analysis, meteorologists, and mathematicians.

A prime task of personnel under this category is to manage and monitor one, or more, development contracts. These will range in dollar value from as small as $5,000 to several million dollars. The nature and complexity of these contracts, rather than their dollar value, will determine the number which can be supervised by one manager so that the interests of the Government are best protected. The contracts cover such subject areas as data processing systems, communications systems, collision avoidance systems, and improved automation systems.

Test and Evaluation

The Federal Aviation Administration Technical Center requires a staff of engineers, air traffic controllers, computer specialists, physicists, pilots, aircraft mechanics, and various skilled technicians. These personnel are engaged in project activities in all phases of air navigation, air traffic control, airport design and development, systems evaluation, communications weather, and aircraft safety. Flight support of projects is provided by airmen flying and maintaining aircraft ranging from small single-engine aircraft to high-performance jet and turboprop aircraft. Some typical test and evaluation projects are: flight testing and evaluating the performance of collision avoidance and navigation systems; testing of equipment for use in detecting, processing and dissemination of significant weather information, and test and evaluation associated with new automation systems.

Aeromedical Research

The aeromedical research efforts of the agency, conducted at the Civil Aeromedical Institute (CAMI) are aimed at controlling the biomedical factors that are causes of or contribute to, control errors and incidents in the National Airspace System (NAS). They are concerned with flight personnel and air traffic control specialists and their work environment. These programs cover all the broader aspects of biomedical factors related to the airways system, including bio-engineering, psychology, physiology, pharmacology, biochemistry, and general medicine to determine the adverse effect of disease and physiologically induced deficiencies on the performance of air traffic control specialists.

SUMMARY OF REQUIREMENTS BY ACTIVITY

[Fiscal years]

	Authorization	
	1988	1989
1. Air Traffic Control	$127,192,000	$135,866,000
System	34,494,000	63,215,000
Beacon	3,562,000	7,508,000
Aircraft Separation Assurance	2,522,000	256,000
Communications	57,360,000	18.638,000
Airport/Airside/Landside	6,438,000	8,553,000
Enroute Control	0	1,240,000
Flight Service Stations	600,000	1,245,000
Terminal/Tower Control	2,970,000	5,593,000
Technology	11,484,000	24,160,000
Support	7,762,000	5,458,000
2. Advanced Computer	7,743,000	15,716,000
3. Navigation	9,818,000	11,395,000
Navigation	6,539,000	5,513,000
Approach and Landing Systems	3,279,000	6,242,000
4. Aviation Weather	21,957,000	21,797,000
5. Aviation Medicine	6,307,000	6,613,000
6. Aircraft Safety	24,988,000	21,013,000
7. Environment	3,000,000	2,600,000
Total	201,005,000	215,000,000

1. AIR TRAFFIC CONTROL, FY '88: $127,192,000; '89; $135,866,000

This activity provides for improving the airways systems by applying existing technology to air traffic control problems to keep the current system operating safely with maximum efficiency and by providing system improvements to increase the capacity of the current system. This activity is critical to meeting the goals and objectives of the National Airspace System (NAS) Plan. This activity is broken down into 8 individual programs as follows:

01 System
03 Beacon
05 Aircraft Separation Assurance
06 Communications
08 Airport/Airside/Landside
12 Enroute Control
13 Flight Service Stations
14 Terminal/Tower Control
16 Technology
21 Support

01 SYSTEM, FY '88: $34,494; '89: $63,215

Basis for Authorization:

The objective of this program is to provide the system-level engineering direction and guidance used by FAA in formulating and conducting its research, engineering, and development activities to support the agency's research and development requirements.

Description of Solution:

This program provides the overall system analysis, engineering, planning, and direction for the research and development programs needed to support near-term improvements and long-range modernization of the National Airspace System (NAS). The program includes evaluations of current Air Traffic Control (ATC) system performance, analyses of new operational requirements, definition of functional requirements for new system capabilities, determination of future system performance requirements, engineering of the overall architectural design of the modernized NAS, and conducting benefit versus cost studies for proposed additions to the system. It also includes development of advanced ATC concepts which hold promise for improving the efficiency of the total system and increasing the productivity of the workforce that maintains and operates the ATC system.

The elements included in this program are:

System Engineering and Analyses

    1. Systems Engineering and Systems Engineering Management
    2. NAS Development Studies and Advanced Concepts Studies
- System Requirements
    1. System Capacity
    2. Separation Standards
    3. Advanced Navigation Systems
- Advanced System Concepts
    1. Automated En Route Air Traffic Control
    2. Advanced Traffic Management System, Dynamic Special Use Airspace Management, User-Preferred Trajectories, and Oceanic Traffic Management
    3. Automatic Dependent Surveillance
    4. Low Altitude Surveillance
    5. Terminal ATC Automation and Airport Surface Traffic Automation

Program Element Title: Systems Engineering and Analyses
Subprogram Title: Systems Engineering; Systems Engineering Management

Basis for Authorization:

Continually evaluate the National Airspace System (NAS) Plan projects and subsystems for needed improvements in light of evolving requirements and available technology.

Description of Solution:

In conformance with objectives of the NAS Plan, evaluates on a continuing basis the development, update, and management of the NAS system architecture. This will include, but is not limited to, analysis of operational requirements; maintenance of the requirements baseline; development of operational concepts; allocation of requirements to the subsystems of the NAS; definition of functional interfaces between subsystems, information flows and connectivity; development of system specifications; and incorporation of newly approved programs into the system design.

In FY 1987, the design and modification of proposed NAS programs, which included quantified performance requirements, continued; e.g. Flight Service Automation System, Traffic Management System, GPS monitors, Terminal Doppler Weather Radar, interfacility communications, etc. An in-depth technical review of design information was conducted and NAS Level I Design document and NAS System Specifications were updated. In FY 1988, efforts will continue to address unresolved system issues which were identified during the development of the System Specification. These analyses will develop recommended system solutions, impact assessments, and NAS Change Proposal packages to the Level I Design, System Specification, and other impacted documents. This includes the NAS System Requirements Specification, NAS-SR-1000, and affected project specifications/standards.

Benefits:

The benefits of these efforts will assure an orderly and controlled process in the updating of future NAS architectural design. These efforts will result in a more effective implementation of the NAS with assurance that necessary functions are performed, that all interfaces are properly defined and met, and that subsystem functions are efficiently allocated.

Program Element Title: Systems Engineering and Analyses
Subprogram Title: NAS Development Studies; Advanced Concepts Studies

Basis for authorization:

To perform the continuing analyses required to identify future NAS enhancements necessary to assure the future safety, productivity, and efficiency of NAS operations.

Description of Solution:

The purpose of this project is to perform the analyses required to understand the requirements the NAS must meet in the future, the technology opportunities available for meeting these requirements, and the R, E&D program required to develop these opportunities for implementation.

Advanced Concept Studies will focus on the 2010 period when technologically advanced aircraft will be operating in the NAS, and the magnitude and nature of demand for aircraft operations may be significantly different from today's. Services provided by the NAS may require significant restructuring to accommodate new requirements and technologies. Advanced Concept Studies will concentrate on definition of the operating environment in 2010 and the nature and magnitude of the demand for NAS services. An independent study of alternative methods of air traffic control based on enabling technologies and changed requirements will be performed.

NAS Development Studies take the current NAS Plan projects and subsystems as the starting point and develop a view of NAS evolution to the end point provided by the Advanced Concept Studies. The analysis process will begin with comprehensive assessment of the performance of the NAS and analysis of anticipated demands and requirements to include the need to support advanced technology aircraft emerging from national programs to exploit aeronautical R&D opportunities. NAS development plans, including the NAS Plan, will be assessed for the extent to which they will meet anticipated requirements through the 2010 time period. Development alternatives for meeting unfulfilled requirements then will be assessed from technical and operational perspectives. The most promising alternatives will be selected for further development as defined R&D projects based on documented operational concepts and cost/benefit projections.

The analysis process will provide a description of the foreseen NAS evolution through the 2010 time frame to include the cost/

benefit implications of the evolution. It also will provide an input to the R, E&D program plan which is updated annually.

Program Element Title: System Requirements
Subprogram Title: System Capacity

Basis for Authorization:

Increase the capacity of the NAS to accommodate existing and future (higher) levels of air traffic. The goal is to provide for a more productive and energy-efficient system by reducing ATC delays due to system capacity limitations.

Description of Solution:

Recent studies sponsored by the FAA and the aviation industry have identified a number of operational concepts that provide for independent instrument approaches to multiple runway configurations. These concepts may increase airport capacity and reduce delays. This project will determine the economic and operational feasibility of these concepts. In addition, it will develop appropriate procedures and define avionics and ground equipment requirements to implement the concepts.

In FY 1987, site specific studies were conducted to quantify the suitability of the various landing monitor and procedural concepts available for reducing closely spaced parallel runway separation requirements. The various options include the following: (1) a new radar system with an automatic alarm capability and new display, (2) application of Mode S monopulse feature with an automatic alarm feature, (3) utilization of existing ASR landing monitor in conjunction with the almost parallel landing procedural concept, and (4) enhancement of existing ASR with an automatic alarm capability when applying the almost parallel procedural concept.

Using the results achieved in FY 1987, a landing monitor concept will be selected and development started in FY 1988 for parallels and other closely spaced runway separation requirements. Work will also begin on defining and selecting other promising concepts for independent IFR approaches to other site specific runway configurations. In addition, the development of a landing monitor test bed for evaluating automatic alarm features and controller displays will be established to assure an adequate controller capability to safely and efficiently monitor approaches and missed approaches based on the new landing procedures.

Benefits:

Increase airport IFR capacity. Reduce ATC delays due to airport capacity limitations.

Program Element Title: System Requirements
Subprogram Title: Separation Standards

Basis for Authorization:

Analyze requirements and provide quantitative guidance for aircraft separation standards and procedures for the continental U.S. and overocean operations.

Description of Solution:

Provide analyses, simulations, and tests to continuously revalidate the safety of current U.S. and international separation standards and develop quantitative guidance for the establishment of new standards.

Both the domestic and international aviation user communities have proposed that the vertical separation standard above 29,000 feet be reduced from 2,000 feet to 1,000 feet. One thousand feet is the current standard below 29,000 feet. If this reduction can be safely accomplished, it is estimated that the domestic user community will save approximately $60 million per year through reduced fuel consumption. Analysis of safety verification flight tests was completed in FY 1987. Data collected will be reduced to derive the aircraft performance requirements necessary to support a safe reduction in the vertical separation standard above 29,000 feet. In FY 1988, the United States will submit to the ICAO this safety verification analysis which will be combined with the worldwide effort for international approval and implementation. In parallel with this effort, a data package to support rulemaking within the U.S. will be prepared and provided to AFS.

In FY 1987, an effort was initiated to draft guidance material for ICAO on aircraft Minimum Navigation Performance Standards (MNPS) to support horizontal separation standards in airspace without radar monitoring. This material will be completed in FY 1988.

Program Element Title: System Requirements
Subprogram Title: Advanced Navigation Systems

Basis for Authorization:

Review and update aviation navigation requirements, evaluate current and future system mixes, and plan for the federally-funded radionavigation system mix of the future to assure a safe and efficient navigation system for all civil and military users of the National Airspace System.

Description of Solution:

In conformance will the Federal Radionavigation Plan, future navigation system candidates must be subjected to a total system analysis addressing safety and economic performance, as well as an operational and technical assessment. System candidates will be analyzed to qualify their feasibility and effectiveness. The relative merits and deficiencies of the candidates will be identified and assessed in comparison with requirements. Based on these results, technical and functional specifications will be developed for recommended candidates.

In FY 1987, the FAA participated in the joint DOT/DOD effort to select and publish the joint DOT/DOD recommendations for the post-1995 radionavigation systems mix. In parallel with this effort, the Fourth Edition Federal Radionavigation Plan was published.

One example of a future navigation system is Global Positioning System (GPS). In FY 1988, a functional specification for monitoring the GPS will be completed. The monitoring function will expand the role of GPS to include nonprecision approach guidance for the entire continental United States.

Benefits:

Achieve the required level of navigation service for all users (land, marine, and air) in the most cost-efficient manner.

Program Element Title: Advanced System Concepts
Subprogram Title: Automated En Route Air Traffic Control

Basis for Authorization:

Develop Automated En Route Air Traffic Control (AERA) as a means to increase the efficiency and safety of aircraft operations and the productivity of controllers in the en route environment.

Description of Solution:

AERA will use the Advanced Automation System (AAS) computers and new software to monitor the planned flight profiles of all controlled traffic for potential conflicts, to calculate resolutions for predicted flight path conflicts, and to data link clearances to aircraft to assure safe and fuel-efficient aircraft operations.

The development of AERA will occur in three incremental stages: AERA 1, 2, and 3.

The performance specifications for AERA 1 were developed in two separate packages. The first package was included in the Advanced Automation System (AAS) specification in FY 1984 and update providing additional features was added during FY 1985. The specification for these features was provided to the AAS system designers for development and incorporation into the AAS software system.

In FY 1986, the AERA 2 operational concept and functional requirements were completed and provided to the Advanced Automation Program Office for incorporation into the AAS program.

Preservation of ATC system safety is a basic requirement of AERA 3. In FY 1987, extensive analyses were initiated to investigate the safety issues associated with AERA 3. Analyses initiated in FY 1986 to define the AERA 3 functions will be completed in FY 1989. AERA 3 will significantly increase controller productivity and user flexibility by introducing advanced ATC automation that will relieve controllers of many of their tactical control tasks while enhancing their capabilities for strategically managing the ATC system.

In FY 1988, small-scale simulations of alternative operational concepts will be conducted in the contractor's laboratory to test and evaluate candidate AERA 3 functions. The results of this effort will be used in the development of the AERA 3 operational description, which will form the basis for the AERA 3 system-level functional specification. The preliminary AERA 3 operational description and system-level specification will be completed in FY 1990. Follow-on experimentation and testbed evaluations will be conducted at the FAA Technical Center, Atlantic City Airport, New Jersey, to examine the major operational, technical, and regulatory implications associated with a highly automated ATC system.

Benefits:

Flight time and fuel savings from more direct routing, greater accommodation of user-preferred fuel efficient routes, improved levels of system safety, and increased controller productivity through greater automation and use of data link.

Program Element Title: Advanced System Concepts
Subprogram Title: Advanced Traffic Management System; Dynamic Special Use Airspace Management; User-Preferred Trajectories; Oceanic Traffic Management

Basis for Authorization:

Develop traffic management functions to efficiently allocate traffic demand to available system capacity as a means for reducing delays and improving aircraft operating efficiencies.

Description of Solution:

The *Advanced Traffic Management System* (ATMS) will link terminal, en route, and national traffic management functions to enhance traffic management capabilities and provide more precise information to system operators and users regarding current and projected NAS delay/congestion conditions. The ATMS will have the capability to accurately monitor the NAS, provide alerts on projected congestion, generate alternative traffic management strategies, and distribute associated flow directives to impacted ATC facilities.

In FY 1987, operational and functional specifications for an NAS Automated Monitor/Alert function and an Airport Capacity Projection function were developed through the use of the ATMS testbed. In FY 1988, the Automated Monitor/Alert function will be modeled on the ATMS testbed to collect alert data to be used in developing software capable of producing traffic management alternatives for resolving projected congestion conditions, which will be functioning on the ATMS testbed by the end of FY 1988.

The Dynamic Special Use Airspace Management Program is a joint coordination effort between FAA and DOD that will develop procedures and define automation requirements for increasing flexibility in the allocation and use of Special Use Airspace (SUA) by military and civilian users. Operational procedures will be developed for real-time and dynamic coordination between FAA and DOD so that DOD SUA requests can be accommodated rapidly with minimum disruption of civil aviation operations. The program is integrated with and fundamental to the effectiveness of both the AERA and ATMS operational functions. Requirements will be developed for the data base structure and communications necessary to manage dynamic allocation of SUA's. Functional requirements will be developed for the necessary ATC automation at both the Advanced Traffic Management System (ATMS) and Advanced Automation System (ASS) levels to support the modified SUA procedures.

In FY 1988, interagency coordination procedures will be examined to identify functional and performance requirements for the Dynamic Special Use Airspace Management function.

User Preferred Trajectories.—Modern aircraft are equipped to fly direct routes from origin to destination along tracks and vertical profiles consistent with prevailing weather conditions, aircraft performance characteristics, and the operator's schedule constraints. The objective of the User-Preferred Trajectories (UPT's) function is to extend traffic management capabilities to explicitly include this type of flight operation. The project will develop traffic management systems to accurately measure system demand brought about through the use of user-preferred trajectories.

In FY 1988, a model will be developed to simulate UPT's by using minimum time routings based on varying wind and weather conditions. Once this traffic model is established, demand on airspace will be analyzed to determine congestion areas and the capability of current airspace allocation to cope with these congestion points.

The *Oceanic Traffic Management* activity will develop traffic management algorithms for predicting aircraft demand on oceanic airspace. Algorithms will be developed for predicting congestion, and software will be developed for automatically selecting effective strategies for allocating demand to available capacity resources.

In FY 1988, an assessment of oceanic traffic management procedures will be performed. Procedures for assigning tracks in oceanic airspace will be studied in detail. An effort to define requirements for improvements will be initiated.

Benefits:

ATMS.—Reduce delays and increased aircraft operating efficiency through the ability to more accurately allocate traffic demand to available system capacity.

Dynamic (SUA) Management.—Increase the flexibility in the use and assignment of special use airspace to both military and civilian users.

User-Preferred Trajectories.—Accommodate modern aircraft flight characteristics in traffic management planning to improve user operating efficiencies.

Oceanic Traffic Management.—Extend traffic management improvements to the oceanic environment.

Program Element Title: Advanced System Concepts
Subprogram Title: Automatic Dependent Surveillance

Basis for Authorization:

To develop an automatic dependent surveillance function that will permit improved air traffic control operations in oceanic and domestic environments as a means for increased safety and efficiency of flight operations.

Description of Solution:

Oceanic ATC operations today are conducted manually with controllers monitoring flight progress based on voice position reports from flight crews. Aircraft must adhere to rigid route structures with limited flexibility to change altitudes. Relatively large separations must be maintained to accommodate navigation inaccuracies and the lack of accurate position reports at frequent intervals. The resulting airspace capacity limitations and the inability of controllers to approve flight plan changes force aircraft to operate on inefficient routes. Similar problems exist for offshore and low-altitude domestic airspace.

The Automatic Dependent Surveillance program was initiated to overcome these limitations. This program will identify design objectives, including functional capabilities and operational benefits, as a function of evolutionary applications. The system will permit tactical and strategic control of aircraft. Automated position report processing and analysis will result in nearly real-time monitoring of aircraft movement. Automatic flight plan deviation alerts and conflict probes will support reductions in separation minima and increased accommodation of user preferred routes and trajectories. Graphical display of aircraft movement and automated processing of data messages, flight plans, and weather data will significantly improve the ability of the controller to interpret, and respond to all situations without an increase in workload.

The system concept must accommodate all classes of aviation users in a variety of operational environments. Consideration will be given to the variations in the type and rate of information transfers as a function of the environment of application.

In the context of the design objectives and specific environments of application, each element of the ADS concept (i.e., the ground element, the airborne element, and the air/ground communications link) will be described in terms of their respective functional roles.

In FY 1987 work was initiated to define both the functional and operational concepts for the Automatic Dependent Surveillance function in both oceanic and domestic airspace. This effort will be completed in FY 1988. Also in FY 1987, work was initiated to define aircraft avionics and integrations requirements, air ground communications requirements, and air traffic control automation functions.

In FY 1988, communications requirements for automatic dependent surveillance will be completed and incorporated into the FAA's Satellite Communications Program. Automated air traffic control processing and display requirements for enhanced Oceanic Display and Planning System (ODAPS) will be confirmed. Development of the display requirements for the Advanced Automatic System will also be completed in this timeframe. In parallel with this effort, laboratory and flight test evaluations of alternative automatic dependent surveillance designs will be undertaken.

Benefits:

Increase in system efficiency through an increased level of tactical control.

Program Element Title: Advanced System Concepts
Subprogram Title: Low Altitude Surveillance

Basis for Authorization:

To develop a surveillance capability for low-altitude airspace not adequately covered by en route and terminal surveillance facilities.

Description of Solution:

Low altitude surveillance is required in domestic and offshore airspace to support efficient IFR fixed-wing aircraft and rotorcraft operations. A number of alternative low altitude surveillance concepts have been studied which include automatic dependent surveillance techniques based on LORAN-C and GPS navigation with communications provided by VHF data link or satellites and a low-cost Mode S interrogator technique based on the antenna proposed for TCAS.

In FY 1988, comprehensive system requirements for low-altitude surveillance will be formulated, and available technical alternatives will be assessed with respect to their ability to meet these requirements economically. In FY 1989, development and validation of the most promising techniques will be initiated.

Benefits:

Enhanced safety and airspace capacity for IFR operations conducted in low-altitude airspace based on real-time surveillance data to support those operations.

Program Element Title: Advanced System Concepts
Subprogram Title: Terminal ATC Automation Airport Surface Traffic Automation

Basis for Authorization:

Develop ATC automation aids for the terminal airspace and the airport surface to increase the safety and efficiency of aircraft operations in those environments.

Description of Solution:

The *Terminal Air Traffic Control Automation* program will develop the time-based traffic control concepts to accommodate aircraft operations along user-selected flexible approach paths in accordance with operator schedule constraints and aircraft performance characteristics. These flexible, time-based approach paths have a potential for significantly improving aircraft operating efficiencies. In FY 1987, an initial cost-benefit analysis was completed based on preliminary operational concepts. In addition, the process of developing functional and operational requirements was initiated.

In FY 1988, efforts will be initiated to develop the controller-machine interface and operational procedures. In addition, algorithms for the time-based traffic control functions will be developed to the point that evaluations can be initiated.

The *Airport Surface Traffic Automation* programs will apply ATC automation techniques to: (a) develop an effective runway intrusion alarm for ground controllers, (b) sequence aircraft to the departure end of the runway in accordance with departure schedules designed to expedite traffic flow out of the terminal airspace, and (c) optimize the capacity of the airport surface in all weather conditions.

In FY 1988, work will begin on development of functional and performance requirements for airport surface traffic automation, which will serve as the basis for a phased development program. This program will focus initially on reducing runway intrusion incidents.

Benefits:

Terminal ATC Automation: Accommodate efficient aircraft operations along use-Preferred flight paths.

Airport Surface Traffic Automation: Reduce runway intrusion incidents, increase terminal airspace capacity through efficient departure sequencing of aircraft, and increase the traffic handling capacity of the airport surface.

Program Title: *03 Beacon, FY 88: $3,562,000; '89: $7,508,000*
Program Element title: Surveillance Enhancements
Subprogram Titles: Airport Surface Surveillance

Basis for Authorization:

There are expressed requirements in the RE&D plan to provide automatic radar tracking and target classification for improved surface surveillance at airports equipped with airport surface detection equipment (ASDE) radars.

Description of the Solution:

Airport Surface Surveillance.—The ASDE radars provide tower controllers at installed sites with a surveillance capability to monitor the movement of ground traffic in periods of limited visibility. This project continues the research aimed at providing automatic radar tracking and target classification for the ASDE system. The activities of this project are focused on three primary objectives: Development of a target classification technique for ASDE data; specifications of ASDE modifications for tracking targets automatically; and feasibility assessment of Mode S integration to permit data communications for identifying targets. The product of this effort will become an integral part of the Airport Surface Traffic Automation System described in Program 01, System.

In FY 1988, construction will commence on a transportable, integrated ASDE/Mode S test bed. When completed, it will be deployed to validate and demonstrate performance of ASDE target tracking in a real-time mode. The resulting system will support both surveillance and data link communications on the airport surface.

Benefits:

Improved safety on airport surface, and facilitated traffic flow on airport.

Program Title: *05 Aircraft Separation Assurance FY '88: $2,522,000; '89: $256,000*
Program Element Title: Airborne Collision Avoidance System
Subprogram Titles: TCAS II Prototype Evaluation; TCAS II Implementation

Basis for authorization:

The objective of this program is to provide an airborne collision avoidance system for the full spectrum of airspace users, ranging from small general aviation aircraft to large transport aircraft, by a range of collision avoidance equipment alternatives which are independent of the ATC system.

Description of Solution:

The development of Traffic Alert and Collision Avoidance System (TCAS I), which was designed for the smaller general aviation user, has been completed, design guidelines issued for the use of equipment manufacturers, and Minimum Operational Performance Standards (MOPS) have been written by the Radio Technical Commission for Aeronautics. The development of TCAS II, a vertical maneuver system, designed for air carrier use, has been completed and a MOPS has been written. The development of TCAS III with both horizontal and vertical maneuver capability has esentially been completed, and a draft MOPS has been written. The TCAS Program has two ongoing efforts to effect the desired technology transfer to the United States avionics industry and airline community.

TCAS II Prototype Evaluation.—In the first of these efforts, a prototype TCAS unit was installed and flown in a regularly scheduled commercial airline aircraft. Certification and hardware problems delayed the start of this evaluation program into the fourth quarter of FY 1986. Data from the flight test will be analyzed, and a final report will be issued in FY 1988. This demonstration of TCAS usage will provide the airline industry an initial means to evaluate the practical benefits of TCAS operations and a verification of TCAS/pilot interface prior to the fabrication and evaluation of commercial TCAS units.

TCAS II Implementation.—In parallel with the prototype TCAS II installation, a Limited Installation Program (LIP) was initiated as a cooperative cost-shared effort by two avionics manufacturers, three airlines and the FAA. The LIP evaluation effort, providing 14 TCAS–II production units, began in FY 1987 and will extend into late FY 1988. At the successful completion of this effort the FAA will have accomplished the transfer of the TCAS technology and facilitated its implementation by the private sector.

TCAS III Implementation.—In FY 1987 the TCAS II LIP contract was modified to enhance the TCAS II units developed in that program so that they can provide the capabilities of TCAS III operation. Both Allied Bendix and Sperry Dalmo Victor modified the 7 units that each contractor built in the TCAS II LIP Program to provide the precise bearing measurement that is required for TCAS III Operation.

In addition, the TCAS II algorithms were augmented to provide Miss Distance Filtering to reduce the occurrence of unnecessary alerts.

Benefits:

Enhances safety by providing separation assurance back-up to normal air traffic control operations in controlled airspace and for primary separation assurance outside controlled airspace.

Program Title: *06 Communications, FY '88: $57,360,000; '89: $18,638,000*

Basis for Authorization:

The National Airspace System (NAS) Plan requires the modernization, expansion, replacement, and augmentation of much of the Federal Aviation Administration's (FAA's) communication equipment.

Description of Solution:

The communications development will provide products for subsequent implementation in the NAS Plan. It includes a communication system for the switching and transmission of voice and the distribution of data rapidly, accurately, reliably and economically. This will support the future, highly automated air traffic control system which includes the capability for facilities to back up each other upon failure of equipment. The objective includes both air-ground and ground-ground voice and data communication.

The elements included in this program are:

Communications System Design and Data Communications Development:

1. Rotorcraft Communications; National Airspace Data Interchange Network (NADIN); Air-Ground Data Link Application and System Development; Network Management and Control Systems and Future Communications Requirements and Architecture

Voice Communications Development:

1. Voice Switching and Control System Development

Program Element Titles: Communications System Design; Data Communications

Subprogram Titles: Rotorcraft Communications; National Airspace Data Interchange Network (NADIN); Air-Ground Data Link Application and System Development; Network Management and Control Systems; Future Communications Requirements and Architecture

Basis for Authorization:

FAA's mission requires the rapid and efficient transfer of a myriad of data among facilities, between facilities and controllers and between controllers and pilots. The existing communications systems were not designed for nor can they be modified to meet the demand for services or the capabilities required in a highly automated environment.

Description of Solution:

Research, Engineering, and Development efforts in past years have developed designs, concepts and hardware/software products which are evolving into the solutions required to modernize the communications data transfer systems into configurations which will facilitate the realization of the significant benefits of automation.

Rotorcraft Communications.—In the Rotocraft Communications area, work will continue on the development and evaluation of a low-cost, self-contained radio communications system. This system will augment existing VHF AM communications service at low altitudes throughout the forty-eight contiguous states.

Network Management and Control System.—The Network Management and Control System will support activities essential to the integrated management and operation of FAA owned telecommunications utilities (including Data Multiplexing Network, Radio Communications Link (RCL), National Airspace Data Interchange Network (NADIN) Message Switching Network (MSN), and NADIN Packet Switching Network (PSN). Planning and specification efforts accomplished in FY 1988 will provide the basis for initiating work on the development of a prototype Network Management and Control System.

Future Communications Requirements and Architecture.—Communications Systems Design activities will focus on alternative technologies for providing area network access to FAA owned and leased communications utilities. Analyses conducted in FY 1988 will lead to the development of prototype analog and digital area networks in subsequent years.

NADIN.—During FY 1987, system requirements studies and activities associated with contract development and the procurement package were accomplished for the National Airspace Data Interchange Network (NADIN) Packet Switching Network. In FY 1988 studies will be performed to assess the overall communications requirements of the Advanced Automation System in the 1990's and to generate the technical documentation necessary to support the NADIN II, Phase II network enhancements needed to meet the requirements.

Air-Ground Data Link.—Consistent with the NAS plan, the airgound transfer of digital data will be accomplished by means of the integral data link capability of Mode S. Studies of the use of this data link to provide aviation related services to in-flight aircraft were undertaken in prior years. Experiments were begun to permit design of future services identified in prior years. The near-term candidates will include various weather products and ATC communications, which the pilot can request in-flight or be provided automatically. The Data Link National Aviation Standard was published in FY 1987. In FY 1988, proposed initial data link applications will be tested, evaluated, and their benefits verified for implementation with the availability of the Mode S data link. Computer performance functional specifications and appropriate standards necessary for data link applications implementation will be drafted.

Benefits:

Low altitude voice communications in rotorcraft will provide the foundation for rotorcraft and general aviation instrument operations for increased safety. A large benefit will be realized through increased capabilities of rotorcraft emergency medical service operators.

The Network Management and Control System will ensure significant cost savings/cost avoidance through the effective utilization of FAA owned telecommunications utilities.

Timely, responsive, and cost effective area network access initiatives are essential to realizing savings anticipated through implementation of the Radio Communications Link (RCL) and other FAA owned communications utilities, plus further reducing access costs to leased services.

The NADIN program will provide the vehicle for the data communications between the modernized automated facilities of the National Airspace System. It is a critical element in realizing the full benefits of the overall NAS Plan upgrading of automation capabilities.

The Air-Ground Data Link Applications and System Development Program will provide the data link applications necessary to realize much of the NAS Plan benefit in the areas of controller and flightcrew productivity, as well as safety. Many of the NAS productivity benefits cannot be realized unless the automated information can be transmitted among controllers and between pilots and controllers. Safety is enhanced because more information can be transmitted efficiently with the improved communication capabilities. Improvements to the air traffic control (ATC) and flight service station (FSS) systems will result in weather information and ATC clearances being transmitted directly to the cockpit over the Mode S data Link.

Program Element Title: Voice Communications Development
Subprogram Title: Voice Switching and Control System Development

Basis for Authorization:

The introduction of modern and higher levels of automation to meet the expanding demands for service requires expanded capabilities in the various agency's communications facilities and systems. The Bell 300 voice switching system currently in use in the ARTCC's: (1) is not capable of the automatic reconfiguration required by the Advanced Automation System; (2) is not expandable to meet the needs of increased numbers of control sectors planned for Area Control Facilities; (3) requires far more console space than is available in the sector suite common consoles; (4) is very old and is reaching a point where future reliability is in question; and, (5) has increased dramatically in lease costs, by 17% in the last year. It is, therefore, necessary to replace the existing system with a modern state-of-the-art voice switching and control system.

Description of Solution:

Develop a Voice Switching and Control System (VSCS) that will meet the operational requirements for voice communication switching among the air traffic controllers within an Area Control Facility, between air traffic controllers in other Air Traffic Control facilities, and between air traffic controllers and pilots of in-flight aircraft through remote air-to-ground radio facilities.

In October 1986, two contracts were awarded for the design, engineering and fabrication of VSCS prototypes. The VSCS preliminary and critical design reviews were completed.

During FY 1988, work will be completed on developing and checking out hardware and software in the VSCS prototypes. The prototype will be delivered and installed at the FAA Technical Center, and Operational Test and Evaluation efforts at the FAATC will begin.

Benefits:

The VSCS will be based on a system design concept that will permit standardization of console equipment, switching and control equipment, system interfaces, and radio control equipment within Area Control facilities. It will provide a very high level of availability in the support of critical air traffic control functions. The VSCS in conjunction with the Advanced Automation System (AAS) will enable facilities to be consolidated into Aera Control Facilities, with the attendant savings in operations and maintenance staffing levels.

Program Title: *08 Airport/Airside/Landside, FY '88: $6,438,000; '89: $8,553,000*

Program Element Titles: Airport Capacity; Airport Safety Support; Airport Design/Layout/Construction

Subprogram Titles: Airport Capacity Studies; Airport Design Configuration; Airport Safety Planning; Airport Surface Visual Control (Lighting); Airport Safety Support System; All-Weather Taxiway Guidance; Aircraft Ground Performance (Take-off and Landing) Advisory System; Airport Pavement

Basis for Authorization:

Airports represent one of the most critical elements of the air traffic system. They involve safety and capacity which have major impacts on the overall air traffic control system and large investments in providing landing surfaces and facilities for passenger access to aircraft. As such, there is a need to carry out continuing efforts addressing safety activities, pavement construction and maintenance, runway traction, airport lighting, and capacity considerations.

Description of Solution:

The program involves development of products to improve airport safety, improve wildlife control, improve crash-fire-rescue (CFR) systems, improve runway condition reporting, improve aircraft taxiing in all weather conditions, provide an advisory system for aircraft ground performance, provide visual aids for pilots, provide advanced criteria for pavement design, materials, construction, and evaluation, and improve the capability of airports to effectively handle higher volume of aircraft traffic.

Airport Capacity Studies.—In FY 1988, specific task force studies will be continued at congested and soon-to-be congested airports. Eight to ten airports will be investigated and an action plan to increase capacity at each airport will be recommended.

Airport Design and Configuration.—In FY 1988 airport design and configuration studies will be conducted to reduce runway occupancy time and taxiing time to improve airport capacity. The capacity improving recommendations made by industry at 22 pacing airports will be reviewed together with existing and future traffic patterns at the airports. Methods of updating the airfield geometry for current civil transport will be investigated. The number and types of runway exits (low angled, multiple path and standard) needed at the specific airports will be investigated. Also, improved taxiway routes from runways to gates and vice versa will be investigated. In FY 1989, the investigations will be continued, and in addition, design of low angled exits and multiple path exits with the necessary lighting and marking for all-weather conditions will be initiated.

Airport Safety Planning.—Work to identify hazardous operational and physical features at airports will continue in FY 1988. Bird and other wildlife hazards are continuing problems. Animals quickly get accustomed to any devices or methods to keep them away from airport operational areas. Thus, an arsenal of new countermeasures are needed to outsmart them. In FY 1988, improved surface management techniques and the feasibility of using low frequency sound to scare birds will be initiated.

Airport Surface Visual Control.—In FY 1988, work will continue to establish standards for visual aids in different visibility conditions. Signs and lighting systems will be investigated to determine the most effective size, color, pattern, reflectivity and intensity for the different categories of landing weather minima down to and including category IIIb. Category IIIc will require electronic guidance rather than signs and lights. The FY 1988 effort will emphasize the standardization of signs and lighting for runway exits.

Airport Safety Support System.—In FY 1988, work will be initiated to evaluate new and improved firefighting agents, equipment and procedures to reduce capital costs and manpower requirements for firefighting. The work on firefighting is a continuing effort, since new and improved agents and equipment are being developed and marketed. The fire extinguishing capability of the new agent-equipment systems and amount of any toxic gases emitted will be investigated. Standards and specifications for these new systems will be promulgated.

All-weather Taxiway Guidance.—In FY 1988, development work will be initiated on all-weather taxiway guidance for aircraft to support ground movement of aircraft and ground vehicles in low visibility conditions. Specifically, requirements for operations in various weather conditions will be established, and the feasibility of using electronic taxiway guidance system with wire buried in taxiways will be investigated in FY 1988.

Aircraft Ground Performance (Take-off and Landing) Advisory System.—In FY 1988, development and evaluation of ice and snow detection and measurement systems with methods to report snow and icing conditions to the ATC tower will be continued. The results will provide data to pilots prior to take-off and landing. Experiments will be completed on soft-ground overrun materials (sand, gravel, foam, water) for arresting aircraft. The soft-ground effort responds to a recommendation by NTSB. Systems that indicate deceleration during landing rollout and turnoff and acceleration during take-off roll will be investigated. A commercially developed take-off monitoring system and a NASA developed turnoff monitor will be evaluated in FY 1988.

Airport Pavement.—In FY 1988, work will continue on the characterization and application to airport pavements of materials such as polymers and other binders to reduce cracking, promote rapid repair, and decrease maintenance costs. Work will continue on the development of quality control and acceptance criteria in order to provide incentives for contractors to meet FAA airport pavement specification standards. These efforts will be concluded in FY 1989.

Studies on the dynamic response of pavement layers under transient loads will be initiated in order to provide an accurate mechanisitc basis for various nondestructive testing methods and the layered elastic design. Work to provide criteria to minimize and to predict the amounts of seasonal changes in the load carrying capacity of airport pavements because of frost action and thawing will continue and will be concluded in FY 1990.

Benefit:

The Airport/Airside/Landside Program supports more effective use of trust funds by improving design criteria for more efficient construction and maintenance of pavements at lower cost. Safer aircraft ground operations under all weather conditions will result from improved methods for contaminant removal, better lighting and marking, improved CFR systems, improved wildlife control, and more efficient airport designs. The improved technical data and criteria will be added to existing advisory circulars and used to issue new advisory circulars.

Program Title: *12 En Route Control,* FY '88: $0; '89: $1,240,000
Program Element Title: En Route Experimentation and Development
Subprogram Title: Conflict Alert/Resolution

Basis for Request:

A requirement exists in the National Airspace System to provide assistance to the en route radar controllers in resolving potential midair conflicts when violation of separation standards is about to occur.

Description of Solution:

Design changes have been incorporated to improve the performance of the Conflict Alert function. To improve the overall performance of the Conflict Alert, Conflict Resolution Advisory and Mode C Intruder functions, it is required that these functions be integrated. This will improve the performance of the software and the degree of automated assistance provided to the en route radar controller.

In prior years, software development and testing of the Conflict Resolution Advisory and Mode C Intruder functions was completed. In FY 1988, the integration of the three functions will continue for implementation in the Host computer.

Benefits:

Increase aviation safety by providing the controller with conflict alert resolution advisory and conflict alert for IFR/VFR encounters functions.

Program Title: *13 Flight Service Stations, FY '88: $600,000; '89: $1,245,000*
Program Element Title: Flight Service Stations System Development
Subprogram Title: Direct User Access

Basis for Request:

The objective of the Flight Service Station Modernization Program is to meet projected increases in demand for flight services without a proportional increase in staff and higher operating costs. This will be accomplished by extensive use of automation, system consolidation, and the concept of self-briefing whereby the users can access the system directly and obtain a weather briefing or file a flight plan.

Description of Solution:

The implementation of the portion of the program to automate the functions supporting the FSS specialist is being carried out in the Facilities and Equipment program.

The R, E&D program will provide enhancement packages for inclusion in the automated system which will facilitate a variety of pilot self-briefing techniques and the filing of flight plans. Full implementation will meet the projected increase is user demand and also reduce the cost of individual services.

The private sector is providing an increasing amount of FSS type services. These services will be available at a cost to those users who desire any embellishments to the basic FAA Model 2 capabilities.

Benefits:

1981 User Demand, 62 million/year; Cost per Service, $2.57/Service.

1995 User Demand, 115 million/year; Cost per Service, $1.48/ Service.

Program Title: *14 Terminal Tower Control, FY '88: $2,970,000; '89: $5,593,000*
Program Element Titles: Terminal/Tower Experimentation and Development; Airport Surface Surveillance
Subprogram Titles: Sustain ARTS II/IIA; Sustain ARTS III/IIIA

Basis for Authorization:

Ensure that the ARTS availability, reliability, and capacity remain acceptable as demand increases.

Description of the Solution:

Sustain ARTS.—The ARTS equipment must continue to operate at the current level of reliability and provide the necessary air traffic control services until replacement by the Advanced Automation System. FAA must define the improvements needed to extend the life of the ARTS systems and meet projected air traffic system requirements until approach control functions are consolidated in the mid to late 1990's Area Control Facility implementation.

During FY 1988, needed ARTS improvements will be defined and may involve improving software efficiency and selective hardware replacement.

Benefits:

The program will keep the ARTS working and operational until the Advanced Automation System is implemented.

Program Title: *16 Technology, FY '88: $11,484,000; '89: $24,160,000*

Basis for Authorization:

Cost reductions and system efficiencies will be developed through analysis and application of new technology.

Description of Solution:

This program provides for the evaluation of advanced technologies to determine their potential applicability to the future National Airspace System (NAS), especially in the fields of data processing and displays, satellites, and human factors engineering.

The elements included in this program are:

Controller Human Factors:

1. Evolution of Controllers' Role; Guidelines for Controller Displays and Data Entry Devices, and Controller-Machine Interface Tasks

Advanced Technology:

1. Rotorcraft Simulator Visual Scene and Rotorcraft Simulator Motion System
2. Wake Vortex Technology and Advanced Wind Shear Sensor Development

3. Satellite Technology
4. Voice Data Entry

Advanced Computer Science Applications:

1. CADM—Flow Management Applications; CADM—Assisted Air Traffic Control Techniques, and CADM—Assisted Training

Program Element Title: Controller Human Factors
Subprogram Title: Evolution of Controllers' Role; Guidelines for Controller Displays and Data Entry Devices; Controller-Machine Interface Tasks

Basis for Authorization:

As additional levels of automation are exploited to support ATC, it is essential to assure that the functions and responsibilities assigned to the controller are appropriate. It is also essential to assure that the controller-machine interface is adequate.

Description of the Solution:

There are three elements in this program.

Evolution of Controllers' Role.—This project will provide a human factors background for reviewing proposed modifications in controller tasks. It will provide a comprehensive understanding of the controllers' environment and develop guidelines for effective division of functions and tasks between the controller and the automation system.

In FY 1988, a comprehensive inventory of controller functions and responsibilities will be initiated.

Guidelines for Controller Displays and Data Entry Devices.—Technology advances offer new display and data entry devices for the evolving controller automation interface. In particular, color displays and touch panels offer a number of new opportunities. This project will maintain on a continuing basis technical guidelines for displays and data entry devices.

During FY 1988, controller-machine operational scenarios involving display/data entry systems will be defined and evaluated.

Controller-Machine Interface Tasks.—The role (tasks) assigned to the controller, the means (displays and data entry devices) provided to support that role, and the traffic levels to be serviced combine to impose a certain workload on the controller. This workload must remain within acceptable bounds as the ATC system evolves. There are three essential steps involved in assessing the acceptability of controller workload: (1) developing measures of workload, (2) determining acceptable workload levels in terms of the measures developed, and (3) assessing workload levels that would be imposed by the foreseen evolution.

This project will extend earlier efforts to develop workload/performance measures and limits, and will perform workload/performance assessments in support of experiments undertaken to develop display and data entry device guidelines. The information developed will be maintained in a comprehensive data base to provide a national reference with respect to controller workload/performance levels in the evolving ATC system.

In FY 1988, work will begin to develop comprehensive controller workload models for validation based on existing controller tasks.

Benefits:

These projects will provide the knowledge and understanding necessary to support design of the controller-machine interface in the evolving ATC system.

Program Element Title: Advanced Technology
Subprogram Title: Rotorcraft Simulator Visual Scene; Rotorcraft Simulator Motion System

Basis for Authorization:

Establish the necessary criteria and guidance for the FAA's evaluation of helicopter simulators for flight crew qualification and recurrent training. The evaluation criteria will be stated in FAA Advisory Circular "ASO-205 Helicopter Simulator and Visual System Evaluation." This research is a cooperative effort with NASA Ames.

Description of Solution:

The two elements in this effort follow:

Rotorcraft Simulator Visual Scene.—Meaningful helicopter training through simulation demands precise visual cuing over a wide range of speeds and altitudes. In FY 1988, a plan will be developed to establish the visual system performance requirements for helicopter simulator training and an analysis of the resolution, vertical field of view, and scene detail necessary will be initiated.

Rotorcraft Simulator Motion System.—The motion system of a helicopter simulator must reflect accurately the handling qualities of the vehicle. In FY 1988, a plan will be developed to establish the motion system requirements for helicopter simulators. The plan will include an analysis of the synchronization requirements between motion and visual systems. In FY 1989 and FY 1990, simulator tests will be conducted and reports published that will define the criteria for both the visual and motion system performance.

Benefits:

A simulator capability to replace part of the actual flight time required for initial crew qualification and recurrent training will reduce significantly the cost of these functions.

Program Element Title: Advanced Technology
Subprogram Title: Wake Vortex Technology; Advanced Wind Shear Sensor Development

Basis for Authorization:

Develop technical and operational alternatives which have the potential for alleviating ATC system hazards and constraints associated with wake vortices and wind shear.

Description of Solution:

Wake Vortex Technology.—The objectives of this effort are: (1) to forecast changes in the duration of the wake vortex hazard so that aircraft separation standards and associated airport capacity constraints can be modified to account for weather conditions; and (2) to improve current methods of avoiding hazardous wake vortex encounters by adapting separation standards and procedures to more accurately reflect the actual hazard.

There are three projects in this area as follows:

Wake Vortex Avoidance.—(Wake Vortex Prediction Model)—In FY 1987, using existing data and aerodynamic principles, a computer model was developed to classify aircraft in accordance with their wake vortex generation characteristics. In FY 1988, this model will be validated by flight test measurements of the wakes from several new aircraft types. The model will then be used to assign the new aircraft types to the appropriate class and develop wake vortex separation standards which are safe and maximize airport capacity for the current mix of aircraft under wake vortex conditions.

Wake Vortex Forecasting.—In FY 1987, a final report was completed on modeling the effects that meteorological conditions have on the generation, transport, and decay of wake vortices. During FY 1988, the meteorological factors affecting the wake vortex behavior will be identified and correlated with a turbulence parameter such as Richardson Number, resulting in a financial report on the feasibility and utility of varying aircraft spacing as a function of weather conditions.

Rotorcraft Wake Vortex Avoidance.—In FY 1987, using the Laser Doppler Velocimeter to measure helicopter-generated wake vortices, a report on the characteristics of rotorcraft wake vortices was completed. In FY 1988, this data, combined with results from additional flight tests, will be used to define rotorcraft wake vortex classes as well as final rotorcraft separation requirements. A recommendation for proposed rotorcraft separation standards will be completed in FY 1989. Separation standards resulting from these recommendations will ensure the safety of rotorcraft flight operations while permitting a more expeditious flow (and mix) of air traffic.

Advanced Wind Shear Sensor Development.—The objective is to develop a low-cost ground-based high-powered carbon dioxide laser wind shear sensor.

This research is a cooperative effort with the National Oceanic and Atmospheric Administration (NOAA). In FY 1988, the first phase of this effort will be to conduct the feasibility of testing the NOAA pulsed CO2 lasers to measure winds in clear air near the ground.

Benefits:

The three elements of the Wake Vortex Technology Program ensure safety of aircraft operations through the development of appropriate separation standards and vortext detection/forecasting capabilities.

Improved ability to reliably predict and detect windshear will reduce incidents of hazardous aircraft encounters with windshear.

Program Element Title: Advanced Technology
Subprogram Title: Satellite Technology

Basis for Authorization:

To develop appropriate applications of satellite technology to communications, navigation, and surveillance (CNS) functions in support of civil aviation.

Description of Solution:

A systems approach is used to develop a framework for the application of satellite-based CNS techniques to the NAS. The approach begins with a validation of user requirements for modified and/or extended CNS services (e.g., requirements identified by Radio Technical Commission for Aeronautics Special Committee 155). These requirements are analyzed against various candidate satellite-based concepts through an assessment of technical characteristics, risks, costs, benefits, and projected service availability schedules. The analysis will include an assessment of transition and institutional issues, such as owner/operator relationships and international coordination of CNS services and technical standards.

In FY 1987, air-ground satellite communications functional requirements related to operational control of air traffic and transmission of ATC data bases to aircraft were identified.

In FY 1988, the satellite-based aircraft/ground communications standards will be developed and a Satellite Communications testbed will be established to validate these standards. In FY 1988, requirements for integrated satellite-based CNS services will be developed. The report of Radio Technical Commission for Aeronautics Special Committee 155 will provide guidance in this area.

When GPS is first available for operational use, it will only be a supplemental system for aviation. To become a sole-means system for aviation use, integrity and coverage changes must be made to the system concept. During FY 1988, the required GPS changes identified in prior years will be developed.

Benefits:

Satellite air-to-ground communications effort will provide, as appropriate, real-time voice and data communications worldwide during all weather conditions to support ATC tactical control over low altitude, remote, and oceanic areas.

Intergrated satellite-based CNS services are expected to provide significant capital investment and operating efficiencies for users and providers of CNS services in the NAS.

GPS is expected to provide a near-term worldwide civil aviation navigation capability in all weather conditions with an accuracy and reliability that meets navigation requirements for all phases of flight except precision landing.

Program Element Title: Advanced Technology
Subprogram Title: Voice Data Entry

Basis for Authorization:

ATC automation techniques under development increasingly require knowledge of voice clearances to air crews by controllers. Voice data entry has the potential for automatically converting voiced clearances into machine readable data.

Develop a voice data entry capability suitable for ATC use. Voice data entry converts voice into digital information suitable for controller-pilot data link communications and entry into automation devices (both ground and airborne systems).

Description of Solution:

This effort will examine ongoing research in the field of voice encoding technology to assess the extent to which this technology will be able to support data link and man-machine ATC operations in the foreseeable future.

In FY 1988, an effort will be initiated to develop ATC requirements for voice data entry and to develop a comprehensive program plan for identifying specific opportunities for applying voice encoding technology to controller-pilot digital data link communications and machine inputs/commands.

Benefits:

Voice data entry will improve safety through clearer controller-pilot communications with fewer interruptions and efficiency through reduced workload for the man-machine interface.

Program Element Title: Advanced Computer Science Applications
Subprogram Titles: CADM—Flow Management Applications; CADM—Assisted Air Traffic Control Techniques; CADM—Assisted Training

Basis for Authorization:

Develop advanced computer technology, in particular artificial intelligence (AI) and computer-aided decisionmaking (CADM) applications, to improve the safety and efficiency of the NAS. The focus is on traffic management, air traffic control, and controller training.

Description of Solution:

The field of Artificial Intelligence and Expert System technology has fostered major advances in computer applications within high technology systems.

The Advanced Computer Science Applications program will establish research facilities and testbeds utilizing AI-oriented hardware (e.g., Symbolics processors) and software (e.g., LISP) that provide for significant increases in research versatility and flexibility. The research will focus upon expert system technology applications to ATC flow management, air traffic control, and controller radar training.

CADM—Flow Management Applications.—In FY 1988, work will begin to explore the application of an expert system to generate alternative national flow management strategies. This work will be aimed at determining the technical and operational feasibility of integrating this technology into the Advanced Traffic Management System (ATMS) described in Program 01, System. The application will enable more dynamic and situation specific strategies for addressing current and/or projected NAS congestion and delay conditions.

CADM—Air Traffic Control Techniques.—In FY 1988, work will begin to explore the technical and operational feasibility of an expert system application to tactical en route ATC functions. Initial analyses and experimentation will seek to determine if an expert system can "control" basic air traffic control situations. Subsequent work will determine the degree to which en route air traffic control can be automated. This work will be aimed at supporting the Automated En Route ATC (AERA 3) program and will enable expanded and more dynamic AERA capabilities. An expert system application to tactical ATC will be a key to achieving both enhanced user flexibility and controller productivity.

CADM—ATC Assisted Training.—In FY 1988, work will begin to explore the technical and operational feasibility of an expert system support to controller radar training. The objective will be to capture standard control techniques within the expert system monitoring the ATC exercise and providing post-exercise feedback. This application will ensure consistent evaluations relative to the training department standards and permit fully qualified controllers to devote more time to their primary duties. This application will also provide additional insight over an extended period into the complexities of the ATC environment as input to the development of expert system tactical ATC applications.

Benefits:

Flow Management Applications.—A more efficient ATC system through more effective and precise national flow management planning. A more efficient ATC system will enhance system fuel economy and user productivity.

Assisted ATC Techniques.—Enhanced ATC system and controller productivity through the transfer of certain manual ATC control functions to the automation system. This capability would also enable a more efficient utilization of the available airspace.

Assisted Training.—Enhanced training productivity due to the reduced requirement for one-on-one instructor/trainee exercising of radar training simulations. This translates into an increased number of radar controllers available for controlling traffic.

Program Title: *21 Support, FY '88: $7,762,000; '89: $5,458,000*
Program Element Titles: In-Service ATC Simulations; ATC Requirements Studies
Subprogram Titles: FAA/NASA Simulations; Rotorcraft Display and Control Standards; Rotorcraft TERPS; Rotorcraft Obstruction Avoidance; Small Business Innovative Research; Rotorcraft ATC Terminal; Program Support

Basis for Authorization:

This program provides technical support for solution of overall ATC system problems which do not logically fall into any one of the other development programs.

Description of Solution:

The objectives of this program are to satisfy requirements for overall ATC system improvements and to conduct analyses and development activities to accomplish objectives related to resolution of systems integration problems, monitoring development progress, conduct of experimental investigations at Ames and Langley Research Centers and analytical and programming support for the FAA Technical Center support facilities.

FAA/NASA Cooperative Programs.—Support services are being provided for experimental investigations at Ames and Langley Research Centers using their simulation, wind tunnel, and other technical facilities for the FAA Langley and Ames Engineering and Development Field Offices. In FY 1988 NASA facilities will be utilized for experimentation in cockpit display, digital flight controls, navigation and human factors programs. The FAA will continue to cooperatively work with NASA looking at human factors aspects of introduction of new capabilities into existing and future cockpit technology.

Rotorcraft Display and Control Standards.—In FY 1988, research activities in rotorcraft display and control standards will assist in the development of certification guidelines for single-pilot IFR operations and advanced control systems.

Rotorcraft TERPS.—In FY 1988, helicopter terminal instrument procedures data will be collected to develop criteria for MLS area navigation precision approaches.

Rotorcraft Obstruction Avoidance.—Various approaches for improving low-altitude flight safety will be analyzed including development of new operational procedures, development of improved standards for marking and lighting of obstructions, modification of low-altitude charts, as well as technological approaches such as obstruction detection and protection systems. Cost/benefits analyses will be used to recommend the best combination of approaches.

Small Business Innovative Research.—Public Law 97-219, Small Business Innovation Development Act of 1982 (SBIR) requires FAA to provide funding to strengthen the role of small innovative firms in federally funded research and development. The law stipulates that 1.25 percent of extramural research and development obligations be devoted to the SBIR program.

Rotorcraft ATC Terminal.—In FY 1988, the Northeast Corridor low altitude instrument flight rules (IFR) helicopter routes will be analyzed. Recommendations will be developed for integration with visual flight rules/special visual flight rules terminal control area access routings and with IFR approaches to facilities served by the corridor.

Program Support.—In FY 1988, support to development and management of R,E&D programs will continue to monitor and track research and development activities. New FY 1988 program status will be added and tracked.

Benefits:

Airport capacity and safety will be increased by providing capability for helicopters to use landing sites other than the primary runways at busy terminals. Greater obstacle protection will improve safety for all low-altitude users. Improvements to the Northeast Corridor will allow it to be used as a national model for the establishment of other helicopter routes, reducing delays for both helicopter and fixed-wing operators.

2. ADVANCED COMPUTER, FY '88: $7,743,000; '89: $15,716,000

This activity which provides the funding for in-house personnel is critical to the overall implementation of the NAS Plan and the development of en route and terminal advanced automation systems designed to accommodate the accelerating demands for air traffic services expected beyond the mid-1980's. In addition to increased system capacity, the higher levels of automation supported by this activity will allow more reliable and safer services to the users of the National Airspace System (NAS). At the same time, the computer modernization program will enable the agency to improve the productivity and provide a more fuel efficient environment for the aviation industry to operate in.

Program Title: *23 Advanced Automation*
Program Element Title: Advanced Automation System

Basis for Authorization:

The current 1960's generation en route and terminal Air Traffic Control systems lack the processing capacity and flexibility necessary to support increasing levels of air traffic and additional automated safety and productivity functions.

Description of Solution:

The objective of this program is to conduct the planning, research, development, and testing activities necessary to support the implementation of a modern air traffic control automation system capable of providing both en route and terminal services.

The Advanced Automation System (AAS) will include hardware, software, and sector suites. The new sector suite will be developed to provide both en route and terminal air traffic controllers with electronic displays of digital radar targets, flight plan data, weather information, and supporting flight information. An individual sector suite will be made up of interchangeable consoles which contain electronic displays, flexible format data entry devices, and a communication control module. Provisions will be made for special configurations of sector suite consoles to meet the requirements for supervisory consoles, oceanic control sectors, and tower displays.

A completely new software system will be designed which will provide for the allocation of software between the central computers and the distributed processors associated with the sector suites. This will ensure availability of critical surveillance data at the sector suites and provide for overall efficiency for the data processing system. In addition, software functions that are now unique to the terminal air traffic control systems will be incorporated into a common software package for both en route and terminal processing.

Two design competition phase contracts were awarded in FY 1984 for the engineering, design, development and testing of the Advanced Automation System. The Preliminary Design Review and prototype demonstration of the Sector Suite Console were completed in FY 1987. Funding requested in FY 1988 will provide for in-house costs associated with executing the program. During FY 1988, source selection evaluation of acquisition phase proposals will be completed, and an acquisition contract will be awarded. Additional funding is requested in the Facilities and Equipment Appropriation budget to complete the design competition phase and initiate the acquisition phase of the Advanced Automation System.

Benefits:

The Advanced Automation System will provide for improved safety and efficient use of the National Airspace System, while minimizing constraints on its users. The AAS will provide the ability to handle safely, the growing civil and military air traffic projected through the 1990's and beyond, and improve productivity of the air traffic controllers. The AAS will facilitate the introduction of new functions which will lead to enhanced systems safety and improved fuel efficiency,

3. NAVIGATION, FY '88: $9,818,000; '89: $11,395,000

This activity provides for modernization, expansion, and improvement of the common aeronautical navigation system facilities in the United States and in overseas areas where international agreements require United States participation. Work in the field of both short and long distance navigation and of landing systems is included. The activity is divided into two programs in which effort will be conducted. These programs are as follows:

04 Navigation
07 Approach and Landing Systems

04 NAVIGATION, FY '88: $6,539,000; '89: $5,153,000

Program Element Titles: Helicopter IFR Operations; Navigation Systems Engineering
Subprogram Titles: Navigation Systems Engineering; Helicopter IFR Operations; Utilization of GPS in Civil Air Navigation

Basis for Authorization:

The FAA has the responsibility for developing and implementing readionavigation systems to meet the need for safe and efficient navigation and control of all civil and a significant portion of military aviation. Projects included in this request respond to the recommended policies and plans set forth in the Federal Radionavigation Plan and to the expressed needs of airspace users. Also addressed are the evolution of user navigation needs, growth in demands on the NAS, and alternative systems and technologies that might meet these aviation requirements. In addition, options and system enhancements intended to aid rotorcraft navigation are requred toassist integration of rotorcraft and other low altitude users into the National Airspace System.

Description of Solution:

Navigation System Engineering.—Emerging technologies and new concepts will be evaluated for applications of navigation services that may satisfy future replacements. This project will directly support the biennial revision of the Federal Radionavigation Plan specifically in the conduct of necessary short term tests or evaluations. Future navigation system candidates will be subjected to total system analyses addressing safety and economic performance as well as an operational and technical assessment. Among candidate future systems will be those based on GPS, on geostationary satellites, and on ground-based and satellite combinations. Included in this project will be an assessment of the direction and capabilities that can be expected in navigation avionics. The avionics and future system examinations will begin in 1988 and continue through 1992 with annual reports on findings; the final evaluation will be used to define the specifics of the future navigation system both in terms of the signals provided and the minimum capabilities necessary in system avionics.

Utilization of GPS in Civil Air Navigation.—Support will be given to foster the operational use of the Global Positioning System (GPS) in the NAS. To gain FAA approval for use in the NAS, GPS will have to meet all established performance and safety requirements. The phase-in process for GPS will occur in progressively more demanding applications. This process will involve tests and evaluations of the available satellite constellations, laboratory simulations, and analytical studies. Initial activity will be directed toward use of GPS as a supplemental aid. The major FAA activity in GPS implementation will be the installation of a signal integrity system. The integrity system is expected to include four signal monitors, a ground-to-satellite uplink capability, and relay packages on two commercial geostationary satellites. As presently planned, procurement of the monitors as part of the NAS Plan will begin in 1988. Under this request a project will be instituted to evaluate the integrity system, simulate potential improvements or increases in capability, and prepare operational specifications for modifications of the integrity channel. This project will begin in 1988 and continue through and after implementation of the GPS Integrity System in the early 1990's in order to define and incorporate all useful and reasonable enhancement.

Helicopter IFR Operations.—In the rotorcraft navigation and landing area, evaluation of a digital automatic flight control system and electronic displays will be completed and research will be directed towards near zero/zero approaches. Preliminary studies on helicopter approach criteria for GPS will be conducted.

Benefits:

User benefits will include an assurance that evolving technologies will provide accurate, safe, and fully usable navigation in the

NAS of the future. Economic benefit will be a decreasing cost for government provided navigation services in the future.

07 APPROACH AND LANDING SYSTEM, FY '88: $3,279,000; '89: $6,242,000

Basis for Authorization:

There is a need to improve safety and efficiency of all phases of flight, particularly during approach, landing, and departure which places the aircraft in its most vulnerable position with respect to weather, hazardous wind shear, terrain, and safety margin. Advanced technology products with accompanying procedures are required for implementation of improved systems.

Description of Solution:

Fleet surveys of avionics equipment have been completed and simulator tests have defined advanced approach capabilities of pilots with conventional avionics. Guidelines have been developed for improved alerting systems to assist the pilot in high workload and emergency situations. Industry guidelines for workload and performance measurement techniques have been developed and are being used to assess the impact of introducing new technology into the cockpit. Wind shear models were developed for simulators and distributed to interested institutions, resulting in the certification of devices for sensing wind shear at the aircraft. A joint Government/industry program is in progress to develop a certificatable wind shear detection and avoidance system.

The elements included in this program are:

Approach and Landing Applications and Flight Deck Systems and Concepts:

1. Precision Approach Improvements; Flight Deck Operations Integration with the NAS; Flight Crew Training Enhancement; Behavioral Criteria for Cockpit Certification; Flight Operations—Expert Systems and

Flight Deck Systems and Concepts:

1. Airborne Wind Shear Detection and Avoidance

Program Title: *Approach and Landing System*
Program Element Titles: Approach and Landing Applications; Flight Deck Systems and Concepts
Subprogram Titles: Precision Approach Improvements; Flight Deck Operations Integration with the NAS; Flight Crew Training Enhancement; Behavioral Criteria for Cockpit Certification; Flight Operations—Expert Systems

Basis for Authorization:

Of all the phases of flight, it is the approach and landing operation that places an aircraft in its most vulnerable position, with respect to weather, terrain, and safety margin. To facilitate safe operations commensurate with the number of new systems to be implemented in the NAS Plan requires new procedures, greater use of computer aids, and improved human factors design and training to prevent degradation of aircrew performance. Research in cockpit systems is done in response to recommendations from both internal FAA Safety and Air Traffic organizations and external sources such as National Transportation Safety Board (NTSB), the President's Commission on Crew Complement (1981), and the Society of Automative Engineers Subgroup and Human Behavioral Technology committees.

Description of Solution:

Precision Approach Improvements.—In FY 1988, display requirements and operational procedures and limitations will be developed and validated in simulators for missed approaches and departure using Microwave Landing System (MLS) Back Azimuth. Simulation studies of MLS curved approaches will continue to support the development of design and certification criteria for advanced displays and control systems.

Flight Deck Operations Integration with the NAS.—In FY 1988, simulation studies to develop recommended cockpit/air traffic control (ATC) procedures will be initiated, based on recommendations from an earlier analysis of data link and Traffic Alert and Collision Avoidance System (TCAS) operational issues. Analyses will be conducted to define 4D ATC issues, which will become part of the data link applications program described in Program 06, Communications.

Flight Crew Training Enhancements.—In FY 1988, studies will be conducted to investigate the benefits of augmenting biennial flight review through the use of low cost simulators, and to evaluate computer assisted instruction methods to improve pilot training.

Behavorial Criteria for Cockpit Certification.—Measurement techniques for the substantiation of minimum crew complement and workload acceptability have been development in previous years. In FY 1988 these techniques will be correlated with crew performance, and development of improved guidelines for total assessment of crew effectiveness will begin. The results will be used to upgrade an Advisory Circular on crew complement determination for FAR Part 25 aircraft.

Flight Operations—Expert Systems.—Previous studies have resulted in functional and display guidelines for a flight status monitor, which will provide computer assistance to pilots by monitoring aircraft systems and performance, and generating prioritized checklists and status displays. In FY 1988, system requirements will be defined for a knowledge-based expert system to provide the sensing and analysis portions of a prototype flight status monitor.

Benefits:

In the approach and landing program, certification guidelines will be developed for cockpit instrumentation and procedures to achieve the full capability of MLS for approach and departure guidance; new procedures designed by Air Traffic Control will be refined and validated by simulation. The Flight Deck Systems subprograms will provide guidelines for acceptable crew workload, and performance measurement methods for use in design, certification, and crew complement determination for new aircraft, as well as supplemental certification for retrofitting new cockpit systems.

Data management procedures, and technology such as expert systems will aid pilots in dealing with the vastly increased information flow and distractions resulting from new NAS services and increased aircraft complexity, thus avoiding adverse effects on crew workload and safety.

Program Title: *Approach and Landing System*
Program Element Title: Flight Deck Systems and Concepts
Subprogram Titles: Airborne Wind Shear Detection and Avoidance

Basis for Authorization:

Of all the phases of flight, it is terminal area operations (the approach and landing, and departure) that places an aircraft in its most vulnerable position with respect to hazardous wind shear. In the United States, during the time from 1964 to 1984, there have been at least 25 airplane accidents and three incidents involving 491 fatalities and 206 injuries where severe wind shear was a contributing factor. The National Research Council reported that development of on-board forward-looking systems (such as airborne Doppler radar and lidar) was inadequate and recommended that steps should be taken to determine the capabilities of forward-looking sensors.

The National Research Council further recommended that the FAA establish a wind shear program manager to develop a wind shear plan. The result is the "National Integrated Wind Shear Plan." This program implements and executes the airborne portion of that plan.

Description of Solution:

The Airborne Wind Shear Detection and Avoidance program is broken into five areas: Forward Looking Wind Shear Sensors for Aircraft, Present Position Sensor Utilization and Integration, Criteria for Hazard Definition and Evaluation, Pilot Factors in Wind Shear, and Rain Effects. In FY 1988, work will be completed on the effects of heavy rain on aerodynamic performance, aircraft sensors, and radomes. Piloted simulations will evaluate forward looking wind shear sensor models and the associated warning system. Flight testing will begin to investigate both forward-looking wind shear sensors and expanded uses of on-board sensor information:

Benefits:

Improvements in safety and reduced user costs from reliable wind shear detection and avoidance devices. Specific benefits include: reduction in weather related accidents and improved traffic flow, when properly equipped aircraft and flight crews locate and assess wind shear hazards prior to encounter; and reduction in crew distractions during the high workload environments of approach to landing and departure, by minimizing false hazardous weather warnings.

4. AVIATION WEATHER FY '88: $21,957,000; '89: $21,797,000

This activity provides for a program coordinated with the Departments of Commerce and Defense and the National Aeronautics and Space Administration to increase the safety and efficiency of the National Airspace System (NAS) by providing weather information tailored for use by pilots and controllers.

This unique weather information is required by the NAS Plan and is necessary to enhance safety and improve the overall performance and utility of the ATC System. This activity is accomplished under a single program:

Program Title: *15 Aviation Weather*

Basis for Authorization:

There is an expressed requirement in the NAS plan to improve the safety and efficiency of the ATC system by enhancing existing and planned air traffic control and flight service station system components and facilities for the collection, processing, and dissemination of significant weather information.

Description of Solution:

The goal of the Aviation Weather Program is to improve the timeliness and accuracy of weather information provided to the National Airspace System (NAS) to reduce the number of weather-related accidents and incidents and to increase both system capacity and fuel savings by reducing weather-related delays. Elements of the program are conducted in close cooperation with the National Weather Service (NWS), the Departments of Commerce and Defense and the National Aeronautical and Space Administration.

This program has three development areas; (1) enhancement to weather services for the NAS for rapid access to hazardous and routine weather products; (2) development of an improved national system for detecting hazardous weather phenomena through the application of Doppler radar technology; and (3) evaluation of meteorological sensors as candidates for a ground-based automated weather observation system to provide observations at airports with approved instrument approaches.

FAA research activities in the above areas are monitored by the Federal Coordinator for Meteorological Services and Supporting Research. This office coordinates the activities of all agencies having weather related missions and activities, including FAA's aviation weather programs related to aviation safety and the efficient use of airspace. The FAA provides a representative to the Office of the Federal Coordinator who ensures comprehensive weather planning on a national level.

The elements included in this program are:

- NAS Weather Enhancements:
    1. Central Weather Processor (CWP)
    2. CWP Future Interface Development
- Doppler Weather Radar Development:
    1. Terminal Weather Radar and NEXRAD
- Weather Radar Development, Processing and Display:
    1. Weather Sensor Enhancements

Program Element Title: NAS Weather Enhancements
Subparagraph Title: Central Weather Processor

Basis for Authorization:

Hazardous weather is a significant threat to safety of flight for all aircraft, particularly in the very critical takeoff and landing phases of flight. Reducing this threat requires that potential encounters with hazardous weather be predicted sufficiently far in advance to allow appropriate avoidance action to be taken by the pilot. Hazardous weather information needs to be provided on a timely basis to permit pilots to avoid the hazard and/or alert ATC specialist to assist pilots in avoiding the hazard.

In addition, better aviation weather information is required in the flight planning phase of flight to increase both system capacity and fuel savings by reducing weather related delays.

Description of Solution:

The central weather processor (CWP) program will provide enhancement to existing and planned air traffic control and flight service station system components and facilities to improve the collection, processing, and dissemination of significant weather information. A CWP will be located in each Air Route Traffic Control Center (ARTCC) and function as the focal point for weather information processing to provide weather data to pilots, air traffic controllers, and flight service station specialists, and will support an automated workstation for NWS meteorologists manning the Center Weather Service Unit (CWSU). The CWP will collect data from the NWS, weather radars, weather satellites, etc. For data distribution, the CWP will interface the en route and terminal ATC computers, the Flight Service Data Processing System (FSDPS), and the National Aviation Data Interchange Network (NADIN).

Development of the prototype CWP will be continued in FY 1988. Delivery of a system for test and evaluation at the FAA Technical Center is expected in FY 1989. Software development for the prototype system will be continued in FY 1988 and testing of the integrated software/hardware system will begin.

Benefits:

As a result of the CWP, air traffic controllers, flight service specialists, traffic management personnel, and pilots will be helped in reducing the effects of weather on air traffic. There will be improved tactical and strategic handling of traffic flows due to improved nowcasts and forecasts. Real-time depictions of severe weather, processed by CWP, including mosaicked NEXRAD products, will be available to air traffic controllers and flight service specialists. This will greatly enhance the weather avoidance service provided to pilots by the ATC system, provide better preflight briefings to pilots from the FSS system, and eliminate manual handling of weather information by controllers. Additionally, in the future, pilots will be able to enter pilot weather reports which will be transmitted over the Mode S data link to the CWP for processing and distribution. The CWP will also automate the operations of the

Center Weather Service Unit allowing the meteorologists to better serve all NAS users.

Program Element Title: NAS Weather Enhancements
Subprogram Title: CWP Future Interface Development

Basis for Authorization:

A number of advanced interfaces of the central weather processor (CWP) to additional sources of weather information and other elements of the national airspace system are necessary to realize the full potential of the CWP to provide better weather information for avoiding hazardous weather.

Description of Solution:

This FY 1988 request is for initial studies, requirements definition, interface requirements documents developments, and in-house management. The CWP future interface development program will develop the interfaces to new sources of weather data and other user systems. New sources include: lightning detection systems, the National Weather Service's advanced weather information processing system for the 1990's (AWIPS-90), the terminal Doppler weather radar, and the uppoer air wind profiler being developed by the National Weather Service. New user systems within the NAS include the Trafic Management System (TMS) and the Weather Communications Processor (WCP).

Benefits:

These interfaces will enhance the benefits of the CWP to the NAS which are reduction of the impact of weather on flight operations within the system and increasing safety by providing better and faster weather information to controllers, pilots, traffic management specialists, and flight service station specialists. The weather communications processor will provide the capability to transmit graphic weather data to the cockpit via the Mode S Data Link. The TMS interface will provide weather radar mosaics received from other CWP's around the nation to be sent to the traffic management specialists along with other up-to-the minute weather data. The terminal Doppler radar interface will provide the CWSU meteorologist with the needed information to better advise ATC regarding flight operations at terminals when severe weather is in the vicinity. The AWIPS-90 interface will provide for exchange of data between the CWSU meteorologists and forecasters in NWS's Weather Service Forecast offices and provide for a means of close coordination between these personnel thus improving the quality of weather information for NAS users. The wind profiler system will provide near real-time upper air wind information.

Program Element Title: Doppler Weather Radar Development
Subprogram Title: Terminal Weather Radar; NEXRAD

Basis for Authorization:

Weather radar presentations available from today's systems have limited utility for air traffic control. Current weather radar provides limited information on the location and motion of servere weather. Improved data will result in more accurate weather forecasts which will contribute to reducing aircraft weather-related accidents, and the selection of fuel efficient routes is required. Future automated ATC functions such as AERA and improved flow management must have reliable and accurate weather data before maximum fuel efficiency and manpower productivity gains projected for these improvements can be realized.

Description of the Solution:

A major NAS activity of the wather program is the development and application of Doppler weather radars to replace existing NWS weather radars and to provide new hazardous weather detection capabilities in the NAS. FAA is participating jointly with the Department of Defense and the Department of Commerce in the development of a common-use Next Generation Weather Radar (NEXRAD) to meet the common weather detection requirements of Government and the public. The NEXRAD system will utilize Doppler radars to probe weather fronts and provide information on interior storm circulation. Operations will be able to detect hazardous weather and provide safety related information to pilots, controllers, and meteorologists.

NEXRAD.—In FY 1988 the FAA will explore aviation related enhancements to the NEXRAD software to provide improved weather products to FAA facilities. The FAA's share of the operational network will be funded under the Facilities and Equipment appropriation.

Terminal Weather Radar.—In FY 1988 the FAA will continue the procurement of the Terminal Doppler Weather Radar (TDWR) system funded under the Facilities and Equipment appropriation. The TDWR software package will provide weather products indicating the presence of windshear and thunderstorm activities. R, E&D funding will be provided to develop advanced algorithms to enhance these weather products to allow prediction of the formation of windshear and thunderstorms to provide advance warnings to aviation users.

Benefits:

More accurate and more timely weather information will be provided in a form that is optimized for use by the air traffic control system. Specific benefits will include: improved safety due to reduction in weather related accidents; better fuel efficiency for aircraft operations; reduced air traffic control system delays; improved aircraft flow control; increased system capacity through traffic management; and productivity gains through automation of the weather function as a part of the larger program of increased automation of the total air traffic control system.

Program Element Title: Weather Radar Development, Processing and Display
Subprogram Title: Weather Sensor Enhancements

Basis for Authorization:

The full potential of the Automated Weather Observing System (AWOS) cannot be realized until a number of enhancements are developed, tested, evaluated, and implemented. Those enhancements will provide improved detection and forecasting of hazardous conditions which are a significant threat to aircraft safety. Included will be the implementation of precipitation type identifiers. Thunderstorms (lightning) are a hazard to aviation and require sensors to accurately locate these phenomena. There is a need to identify and report the different types of precipitation such as rain, freezing rain, hail, and snow, Basic weather research is required to support the development and operational usage of weather sensors and forecast techniques. The requested funding is needed to foster and promote weather research by supporting other Government agencies and private industry.

Description of Solution:

Weather Sensors Enhancements.—Enhancements of sensor capability to provide additional information will be evaluated for feasibility and then developed if approrpriate. Thunderstorm cell definition based upon lightning location data, and the movement and intensity of storms are primarily areas of concern. In FY 1988, the identification of fog, mixed precipitation, hail, and obstructions to vision will be investigated. The use of data from other sensors to improve the identification of precipitation will also be considered.

5. AVIATION MEDICINE FY '88: $6,307,000; '89: $6,613,000

This activity is concerned with the anlysis, assessment, and improvement of the role of the human operator in the air traffic control system, the efficiency, performance, and work environment of airmen, the safety and health of pilots and aircrew, and the safety of passengers and certain ground personnel.

Program Title: *Aviation Medicine*

Basis for Authorization:

The objective of the program is the application of information gained which will benefit, enhance, and advance civil aviation.

Description of Solution:

This program is concerned with the analysis, assessment, and improvement of the human operator role in the air traffic control system; the efficiency, performance, and work environment of airmen; the safety and health of pilots and aircrew; and the safety of passengers and certain ground personnel.

The elements included in this program are:

Aeromedical Program Support
Protection and Survival
Work Force Optimization Research (Analytical)
Human Performance Research

Program Element Title: Aeromedical Program Support

Basis for Authorization:

A continuing need exists to perform toxicology/pathology services in connection with aircraft accidents. In addition to our internal needs in these areas to support aviation safety, we have an agreement with the National Transportation Safety Board (NTSB) to provide post-mortem analyses of tissue specimens to determine contributing toxicological factors in fatal accidents. Also, we now have an agreement with the Federal Railroad Administration (FRA) to provide toxicological services related to railroad accidents.

The Federal Air Surgeon continually seeks refinement in the airman medical certification program to relieve the burden on the certified pilot population where possible and to determine relationships between observable physical/physiological parameters and airman performance. This includes the study of effects of therapeutic drugs, development of relevant vision tests for airmen and air traffic controllers, and injury mechanisms in accidents.

The Federal Air Surgeon's Aeromedical Education Program requires continual study of current problems to update or create new material for inclusion in airmen educational materials and publications. Materials toxicity mechanisms must be better understood to provide agency certification authorities with guidance on cabin interior furnishings and structures.

Description of Solution:

The Civil Aeromedical Institute's (CAMI) Toxicology Laboratory will continue to support accident investigations through analysis of tissue specimens and on-site investigation of aircraft accidents to determine injury contributing factors. Laboratory analysis of submitted specimens will be performed for the FRA in support of their investigation of rail accidents. Also, an experimental study will be made of job-related visual requirements for air traffic controllers. This effort will involve, for example, analysis of typical target sizes, sharpness, contrast, and development and validation of appropriate vision tests. Products for FY 1988 will consist primarily of toxicological reports to the Office of Aviation Safety, FRA, and to the NTSB regarding results of tissue specimen analyses, and a preliminary report for use by the Federal Air Surgeon in determining the possible need for revision of existing airmen and ATC medical standards, such as vision standards and testing methods.

Selected accidents will be investigated by CAMI personnel to determine relevant information, including contributions of various structural elements to injury or lack of injury.

Laboratory toxicity studies of burning materials will be conducted to determine interaction effects or various noxious and irritating gas mixtures.

Benefits:

(1) Increased awareness of physiological factors associated with accidents and consequent actions by the agency to correct areas

within its certification purview. (2) Reduction in damages to aircraft and facilities. (3) Reduction in injury and loss of life in accidents. (4) More relevant airman and ATCs medical certification procedures with possible reductions in time and money costs to the affected population.

Program Element Title: Protection and Survival

Basis for Authorization:

The agency exercises regulatory authority over aircraft manufacturing and operations. New developments in procedures and equipment must be evaluated to determine their effect on aviation safety, particularly with respect to personnel protection. Continuous update of regulatory standards for safety equipment is required, either through abolishment of regulations which are no longer applicable, or by imposition of new requirements. This activity must be supported by analyses performed under this task.

Description of Solution:

The Civil Aeromedical Institute's Protection and Survival Laboratory will evaluate equipment and procedures in response to agency-sponsored requests and commitments. Areas for study are aircraft seat/restraint systems, protective breathing and oxygen systems for aircrew and passengers, cabin evacuation study needs, and passenger flotation devices. Research products for FY 1988 will consist of reports to those offices requesting research which includes:

(1) studies of general aviation and air carrier passenger seat concepts in the laboratory and in accidents;

(2) laboratory evaluations of passenger flow rates through exits;

(3) tests of modifications to flotation devices used on air carrier flights; and

(4) studies of motivational factors in shoulder harness utilization among general aviation pilots.

Benefits:

Reduction in injury and loss of life attributable to failure of seats and restraints in aircraft impacts; reductions to failure of passengers to complete timely evacuation of aircraft following accidents; and reductions to drowning from failure to obtain and use individual flotation devices, or other water survival equipment.

Program Element Title: Work Force Optimization Research (Analytical)

Basis for Authorization:

(1) Determine agency air traffic controller specialist (ATCS) and Aviation Safety Inspector (ASI) needs by designing tests for use in selecting applicants and performance tests for screening them during training. (2) Evaluate the selection, screening, and training programs for validation purposes and to identify weaknesses for

management correction. (3) Monitor personnel work load and environmental stressors by determining the relationship of selected controller, job-related, and situational variables to operational errors, and developing procedures for problem resolution. (4) Assess agency work force job climate factors to contribute to improved morale and work force performance.

Description of Solution:

Periodically update and provide alternate forms of selection tests to the Office of Personnel Management (OPM) and provide performance tests to the FAA Academy for use in training. Provide reports to management on development of new test and measurement systems. Periodically, provide reports to management on selection and training needs and recommended changes to increase program effectiveness, identifying changes in operation and maintenance position requirements, knowledge and skill requirements, and new training course requirements and proficiency measurement criteria. Develop sources such as surveys and operational error analyses for inputs to computer data banks, accomplish analyses and provide reports to management of problems and resolutions. Develop a methology for identifying needed personnel system changes due to automating the NAS; new tests for measuring ATC and ASI proficiency in training on-the-job; new tests for assessing suitability of ASI applicants; reports on ATC an ASI screening and upgrading their training; and reports on monitoring of personnel work load and environmental stressors, including management surveys in support of human relations. Also, review various tests for screening and selection to assure that they are consistent with the tasks which personnel will be performing.

Benefits:

Improvements in screening tests, training programs and knowledge of environmental stresses will aid in reducing initial training failure rates and increase the probability of future retention of Air Traffic Control and Aviation Safety Inspector Specialists. Also, standardization of selection and training procedures for ATCS's and ASI's will result in enhanced aviation safety.

Program Element Title: Human Performance Research

Basis for Authorization:

Evidence from work performed in Canada suggests that the judgment pilots exercise in flight can be enhanced by structured training. This would, in turn, lead to a reduction in accidents attributable to pilot error or human factors. Further work is indicated to detemine methods for imparting the appropriate human factors/judgment training. Work will be initiated to study the application of this activity to advanced pilot certificate holders and to controllers. The new automated ATC system will impose different performance requirements on air traffic controllers. It will be necessary to study the system and requirements to assure optimal compatibility between controllers and their equipment. This will include evaluation of stress/fatigue implications in the operation of new equipment. Continued study of ATC operational errors is needed to establish the existence of any consistent sources of these errors. Also, contining effort is needed on identification of ionizing and microwave health hazards to agency personnel who work with this equipment. Cockpit color vision needs in new technology cockpits will be studied to provide information on possible revisions to medical certification requirements.

Description of Solution:

Continued field studies of pilot training will be performed emphasizing before and after performance assessment of various pilot groups. Also, experimental study of pilot performance will be performed using simulation equipment. Experimental testing of age, shift work, and system interaction will be pursued. Test tasks will include monitoring, information processing, mental arithmetic, visual discrimination, and problem solving. This work will focus on ATC problems that may be associated with the new automated system. Study of job-related tests for screening color vision will be completed for possible application to aircrew. Research products for FY 1988 will consist of reports to the Office of Flight Operations detailing results of field studies accomplished in FY 1987 and FY 1988. Other products will be reports to the Associate Administrator for Air Traffic dealing with studies of human factors of the automated air traffic control system, and to the Federal Air Surgeon specifying results of color vision studies.

Benefits:

Approximately 85 percent of aviation accidents are caused by pilot error or improper decisionmaking. Enhanced decisionmaking or judgment skills can be expected to lead to a reduction in the percentage and absolute number of accidents traceable to poor judgment. Also, findings from simulator based activity may be used in advisory and educational material with the effect of further reducing accidents. Further enhancements in safety will follow from assuring that pilot and controller visual standards are adequate for the tasks they perform.

6. AIRCRAFT SAFETY FY '88: $24,988,000; '89: $21,013,000

This activity supports actions required to foster the design of safer aircraft and increase the security of commercial air travel.

Program Title: *18 Aircraft Safety*

Basis for Authorization:

The Aircraft Safety program has the overall goal of maintaining or improving the level of safety for the traveling public without the imposition of unnecessary economic or regulatory burdens. The program must accommodate a changing technological environment as it relates to industry, the National Airspace System, and Government. New and changing technological thrusts require continued efforts to assist in certification, to determine the adequacy of the Federal Aviation Regulations and to ensure timely applications of new technology.

Description of Solution:

The program objectives are to conduct engineering and development activities which will provide the technical basis to: (1) minimize serious injuries and fatalities by maintaining a survivable environment for occupants, ensuring rapid and safe aircraft evacuation and preventing/mitigating the effects of in-flight fires; (2) assure continuing aircraft airworthiness to prevent accidents and incidents from occurring and to mitigate the effects of in-flight aircraft system failures; and (3) the development of effective and economically viable devices which prevent or deter hijacking and sabotage.

The elements included in this program are:

Fire Safety:
  1. Cabin Fire Safety
Transport/Helicopter/ General Aviation Safety:
  1. Propulsion and Safety Fuel Evaluation
  2. Crashworthiness
  3. Flight Safety
Aviation Security:
  1. Explosive/Sabotage Detection

Program Element Title: Fire Safety
Subprogram Title: Cabin Fire Safety

Basis for Authorization:

Approximately 39 percent of the fatalities in impact-survivable accidents are attributable to fire. Also, over 500 people have died over 13 years, as the result of hidden in-flight fires. Thus, there is a requirement to increase the survivability of aircraft passengers and crew in both in-flight and post-crash fire situations.

Description of Solution:

In FY 1988, fire safety is being addressed through projects that deal with the following facets of the in-flight fire problem: hidden fire detection/suppression, smoke venting, computer-assisted emergency management and improvement of fuselage burnthrough resistance from a post-crash external fuel fire.

The hidden in-flight fire project, initiated in FY 1986, is concerned with the development of effective measures, such as fire detection, suppression, and containment, to prevent fires originating in hidden areas from burning out of control (behind interior paneling, within lavatories, etc.). In FY 1987 full scale tests were completed to characterize the toxic threat of hidden in-flight fires. With the completion of this work in FY 1988, specific recommendations will be made with regard to the usage of fire detectors, extinguishers, and materials in those hidden areas in order to assure prompt detection and fire extinguishment or control for possible regulatory/advisory action.

The smoke venting project will develop optimal procedures for use of the aircraft environmental systems for fire control and smoke evacuation. Completion of Phase I in FY 1986 involved evaluation of current aircraft capabilities using the environmental control system versus the smoke venting requirements for various fire scenarios. Full scale flight testing completed in FY 1987 related to the adequacy of current emergency smoke venting procedures. Phase II involves improvement of the smoke venting capability, if warranted, through either of two options; i.e., optimization of procedures using existing aircraft systems or actual design changes. Phase II will be completed in FY 1988.

Computer-assisted emergency management.—In recent years, great strides have been made in fire detector technology. Also, the trend is toward faster and greater capacity cockpit computers for real-time processing of pertinent flight data. It now appears feasible to utilize onboard computers and recent developments in fire technology to guide or direct flight management decisions by crew members in the event of an in-flight fire. The objective of Aircraft Command in Emergency Situations (ACES) program is the development of a prototype software and hardware module that would prompt the crew on the best course of action during an in-flight fire. In FY 1988 a feasibility study of the ACES concept will be completed. If the results of this study indicates concept feasibility, work will be initiated in FY 1989 to design and construct a breadboard system.

Improvement of fuselage burnthrough resistance.—Work related to improving the resistance of intact aircraft fuselages to burn through from an external post-crash fuel fire will continue. This work is prompted by the recognition that new FAA requirements for fire hardening the cabin interior have substantially increased the time to flash over. Other factors such as the time to fuselage burn now became important as a factor in post-crash fire survivability. In FY 1988, a study will be initiated to identify advanced materials that exhibit increased resistance to burnthrough for critical fuselage components. For example, trends toward the use of lightweight aluminum alloys (lithium) and advanced composite material for aircraft primary structure necessitates evaluation of their impact on fire safety. This evaluation will be initiated in FY 1988 and completed in FY 1989. In addition, work will begin on the development of a small-scale test method for screening the burnthrough resistance of materials.

Benefits:

This effort, by leading to upgraded criteria, test methods, advisory circulars of rule changes for general aviation and transport aircraft, will improve the fireworthiness of aircraft and reduce fire-related fatalities and injuries.

Program Element Title: Transport/Helicopter/General Aviation Safety
Subprogram Title: Crashworthiness

Basis for Authorization:

In spite of improved operational safety measures, aircraft accidents continue to occur. There is a need for the continual incorporation of the state-of-the-art crashworthy design features into aircraft design to provide the maximum potential for occupant and crew survivability in the event of an aircraft crash. The programs in this area address definition of commuter aircraft survivable impact environments, determination of composite structure impact characterisitcs, development of structural airworthiness design methods, establishment of tire maintenance and repair guidance material and development of flight test guidance on vehicle handling qualities.

Description of Solution:

Commuter Aircraft Survivable Impact Environment.—The crash environment study for commuter aircraft initiated in FY 1986 will be completed in FY 1988. Survivable commuter aircraft accidents covering a 10-year period, from 1975 to 1984 are being analyzed to determine the occupant injury and fatality causative factors associated with survivable accidents. In addition, the data from these accidents will be used to define a survivable impact scenario.

These activities will also provide input to a detailed structural analysis of commuter-type aircraft using the analytical modeling program "KRASH" beginning in FY 1988. The analysis will define a structural response envelope for survivable commuter accidents including the survivable range of aircraft impact velocities and the associated impact forces experienced by the occupants, cabin interior furnishings, and seat restraint systems.

Full-scale testing of commuter aircraft and selected components will continue through FY 1988, to validate analytical models and to establish a data base for composite fuselage testing.

Composite Structures Impact Characteristics.—The use of composite materials in primry and secondary aircraft structures requires the development of a technology base so that an adequate crashworthy composite design can be defined. The impact characteristics, crash resistance and energy absorbing capabilities of advanced composite structures were determined in FY 1987 using small-scale and section tests. This activity will be expanded in FY 1988 to include full-scale component testing.

The analytical model KRASH, which was previously calibrated and validated for metal aircraft will be used to analyze composite aircraft structures and will be validated in FY 1988 via full scale aircraft and component testing. The structural response of the fuselage, floor, seat support structures and occupants will be developed for typical dynamic crash loads. This will provide technical data for advisory circulars and design guides. Both metal and composite seats, including energy absorbing designs, will be incorporated into this data package.

Damage Tolerance of Advanced Materials.—The proposed use of new nonmentallic materials in aircraft has necessitated development of airworthiness guidance material related to application of fibrous composite materials in airframe structures and associated subsystems. In FY 1988, an effort will be initiated to generate data to update the existing composite material advisory circular by addressing damage tolerance on pressurized fuselage structures. This effort will involve the study of the effects of crack/damage growth due to repeated cyclic loading on the structural capability of the fuselage.

Structural Airworthiness Inspectors Handbooks.—The FAA Manufacturing Inspectors Handbook of structrual airworthiness design methods associated with the introduction of advanced materials and manufacturing processes, completed in FY 1987, will be updated in FY 1988 and periodically thereafter. In addition, the maintenance airworthiness inspectors reference handbook, developed in FY 1984, will be revised in FY 1988 to reflect current trends in both repair, inspection and inservice experiences. The necessary technical data to formulate advisory circulars, rule changes, or field guidance for FAA field engineers to effectively evaluate the use of advanced materials and processes for type certification, inspection, repair, reliability, etc., will be developed.

Tire Maintenance and Repair.—Field guidance data (Advisory Circular) on the maintenance, repair and retread of bias ply tires completed in FY 1986, was extended to the newly introduced radial ply tires in FY 1987. This activity will be continued in FY 1988.

Aircraft Handling Qualities.—In FY 1986, a program involving fixed and rotary-wing aircraft was initiated to examine the impact on structures and aircraft handling qualities of advanced control systems. In FY 1988, flight tests will be conducted in a variable stability helicopter to obtain and analyze airworthiness and operational data. In FY 1989 flight test guidance material and certification guidelines will be developed for rotorcraft and aircraft using reduced stability techniques and advanced control systems.

Benefits:

Reduce the number of fatalities and injuries due to crash impacts by providing technical data for criteria and performnce standards for airframes, cabin interior materials, seat and restraint systems and fuel systems. Accidents/incidents will be reduced by improvements in tire/wheel design and improved maintenance/inspection practices.

Program Element Title: Transport/Helicopter/General Aviation Safety
Subprogram Title: Flight Safety

Basis for Authorization:

The agency requires data for establishment or refinement of certification standards and procedures for flight in known icing conditions for all categories of aircraft. Both helicopter and general aviation manufacturers have supported the need for improved low altitude icing data. Updated information is needed to assess the airworthiness requirements for advanced fixed and rotary-wing aircraft incorporating critical or essential software-based digital flight control and avionic systems which may encounter atmospheric storms generating electrical hazards.

Description of Solution:

The FY 1988 FAA aircraft icing program forms a part of the National Aircraft Icing Program (NAIP) Council's Plan, which addresses the areas of atmospherics, procedures and technology, and analytical methods. Projects within these areas include: characterization of the atmospheric icing environment for CONUS and worldwide conditions; final preparation of the Aircraft Icing Handbook; development of engine icing testing methodologies; development of icing instrumentation calibration standards; development of test methodologies for evaluation of engine inlet deicing system; continuation of cooperative effort with NASA for enhancement of aircraft icing analytical technology; and continuation of cooperative efforts with DOD for the documentation of military icing qualification/certification experiences and for investigation of icing simulation facilities to minimize testing in natural conditions.

Flight safety research will be addressed in FY 1988 through projects that are concerned with protection of aircraft against lightning and other electrical hazards, and digital systems validation. Projects in these areas are: (1) atmospheric electricity characterization; (2) worldwide lightning data base development; (3) aircraft protection criteria; (4) lightning hazards models and test standards; and (5) digital system validation.

Characterization of Icing Environment.—In FY 1988, atmospheric icing environment characterization will involve completion of data base development for CONUS and worldwide atmospheric icing conditions including supercooled clouds, snow, ice crystals, freezing precipitation, and mixed conditions for all altitudes. This characterization will form the basis for definition of revised aircraft design and certification test criteria.

Aircraft Icing Handbook.—In FY 1988, preparation of the Aircraft Icing Handbook will continue with completion in early FY 1989. Updates for the handbook will be initiated in 1990.

Engine Icing Test Methods.—This program will develop an analytical method for specifying icing test parameters which will permit tests to be conducted over a range of ambient temperatures and to be corrected to standard test conditions.

Ice Measurement Instrumentation.—Development of improved calibration methods for icing research instruments will continue in FY 1988. In FY 1989 this activity will be completed and the results presented in a final report covering calibration standards and recommended implementation methodologies.

Engine Inlet Deicing Systems.—In FY 1988, the engine inlet deicing system effort initiated in FY 1986 will be completed. There will be a final report presenting methods of evaluating engine inlet deicing systems to ensure that resulting shed ice does not cause engine or inlet damage or degraded performance.

Analytical Prediction Methods.—In FY 1988, analytical technology development will encompass a continued long-range cooperative effort with NASA for enhancing utilization of analytical methods, computer codes, and simulation methodolgies for design and certification testing. The two-dimensional computer droplet trajectory model developed in FY 1986 will be expanded to a three-dimensional computer model in FY 1988. This will provide an improved icing analysis capability that will enhance aircraft and ice protection system design for improved operations in icing conditions.

Military Technology Transfer.—Military icing qualification methods and icing simulation facilities investigations will continue in FY 1988 via a continued cooperative effort with DOD. Documentation and analysis of military icing flight test methods will be conducted for possible adaption and use in meeting civil aircraft certification requirements.

Atmospheric electricity characterization efforts in FY 1988 will continue to characterize both intra-cloud and cloud-to-cloud lightning, and to define the aircraft lightning threat, and electromagnetic interference problems. This work will be completed in FY 1990 with a publication of a report on lightning characterization data. The National Interagency Coordinating Group (NICG) in Lightning and Static Electricity (FAA, NASA, DOD, and NOAA) will continue to coordinate national resources in this area.

A worldwide lightning data base on lightning waveform characteristics and aircraft lightning damage will be initiated in FY 1988 with initial reports completed in FY 1989.

Interim aircraft protection criteria for lightning protection on composite aircraft and electronic systems will continue in FY 1988 and be completed in FY 1989.

Lightening hazards models and test standards will be developed in FY 1988 from information gathered in the worldwide data base for protection of advanced aircraft. In FY 1989, the development of models and test standards for protection of aircraft which incorporate advanced structural materials and digital electronics will be completed.

Digital System Validation.—In FY 1988, work will continue to complete Volume II of the Digtal Systems Validation Handbook. Volume II will be completed in FY 1989. The handbook will incorporate technical information for use in regulatory actions dealing with emerging technology and certification issues of advanced aircraft and software-based digital flight control and avionic systems. A workshop will be conducted in FY 1989 to provide FAA and industry state-of-the-art concepts in the digital systems validation process.

Current civil and military efforts in the integrated systems approach of multiple aeronautical disciplines, which are under consideration for applications in future rotary wing aircraft, will be investigated. In FY 1988 initial investigative efforts will focus on fly-by-wire and fly-by-light software-based digital flight control systems, electromechanical actuators, artificial intelligence expert systems, voice command and control, and pilot vehicle system concepts. Flight control structures, propulsion systems, and crew integration concepts will be reviewed to identify critical systems and pilot/vehicle interface problems.

Benefits:

This program will provide for improved safety procedures for flight in known icing conditions. More efficient certification standards will provide for significant economies in the certification process for aircraft. Updated lightening strike, electromagnetic interference hazards, protection criteria, and standards for software-based digital flight control and avionic systems will improve flight safety.

Program Element Title: Transport/Heliport/General Aviation Safety
Subprogram Title: Propulsion Safety Fuel Evaluation

Basis of Authorization:

As new technologies, techniques, and methods are introduced via advanced propulsion systems, improved criteria, standards, and testing guidelines relating to transport, helicopter, and general aviation powerplants are required to maintain safety of flight. Programs designed to provide these products include: analysis of bird ingestion in engine failures, evaluation of stall/surge sensors, development of rotor burst prediction methods, continued investigation of methods of reducing flammability of fuels in crash scenarios, and investigation of the effects of using alcohol-based fuels, and advanced fuel controls.

Description of Solution:

Bird Ingestion Effects.—In FY 1988 and FY 1989 potential problems associated with bird ingestion in the operating fleet of advanced aircraft with new propulsion systems will be identified. Prior year efforts have dealt with the bird ingestion problems of current operational systems. With the influx of greater numbers of the more advanced systems, continued assessment of their performance and safety in the bird ingestion area is needed. Documentation of these responses will be prepared for comparison to existing requirements.

Bird ingestion events have indicated areas where the validity of current certification standards needs review. Projects are being addressed in FY 1988 and FY 1989 that analyze the energy transfer functions between birds and engine blades to assure that requirements and tolerance limits are providing sufficient safety margins.

Rotor Burst Protection.—Based on a study of current containment technology completed in FY 1987 identification of the critical parameters that can be used to predict rotor burst and, hence, provide improved protection against turbine rotor failure will be undertaken in FY 1988. Component testing will be employed to provide improvements using newly developed soft wall containment techniques as well as innovative use of hard wall deflective material to protect critical components.

Fuel Investigations.—Safety fuels that can resist ignition and flame propagation are a valuable adjunct to techniques designed to prevent the release of fuels during crash instances. In FY 1988 activities will continue to identify and evaluate new techniques for reducing the intensity of post-crash fuel fires.

Fuels that possess the safety qualities of kerosene but are suitable for use in general aviation piston engines have been under investigation and development by industry since FY 1986. Such fuel provides improved safety in crash instances. In FY 1988 the safety criteria needed to evaluate their use will be developed.

Alcohol Based Fuel Use.—FY 1988 activities will address the long-term effects of the use of methanol or alcohol-gasoline blended fuels on general aviation piston engines. These effects will supplement the definition of the aging and vapor lock characteristics of autogas developed in FY 1987. The potential use of such modified gasolines in piston engines of either higher pressure ratio design or in low pressure ratio engines supercharged to improve performance, will be investigated.

Advanced Fuel Controls.—Advances in propulsion technology over the next decade will involve the application of computational fluid dynamics to design internal flows, the use of smart controls, and the application of extreme heat-resistant materials. A study will be initiated in FY 1988 on these technology developments to provide the data needed for revising certification criteria and guidance material. The initial study involving engine control and sensor interactions will be completed in FY 1989 and will identify those areas requiring further research.

An in-house evaluation of potential powerplant safety problem areas will be continued, integrating information from such sources as the System Difficulty Report, the Accident/Incident Data Systems Report, etc., with independent assessments and trend analysis.

Benefits:

Solutions to improve propulsion system safety and reliability which will provide a framework for future technology standards to support aircraft engine certification. Improved guidance material available to deal with in-service problems of ingestion, containment, post-crash fire, and operation safety.

Program Element Title: Aviation Security
Subprogram Title; Explosive/Sabotage Detection

Basis for Authorization:

As directed by Public Law 93-366, the agency conducts research and development to make available effective, economically viable devices and systems to prevent or deter hijacking and sabotage in the civil air transportation system. Criminal acts of sabotage and hijacking continue to pose a serious threat to civil aviation throughout the world. Since 1973, criminal acts against civil aviation have resulted in more than 1,500 deaths worldwide, with 140 deaths involving United States civil aviation.

Description of Solution:

The Aviation Security Program is aimed at developing equipment and procedures to improve safety in the following areas: (1) automated explosive detection systems; (2) enhanced concourse security systems; and (3) security system integration.

Automated Explosive Detection Systems.—Multiple contracts for the development of prototype advanced thermal neutron activation detection systems to screen checked baggage and cargo were awarded in FY 1985. The system designs were completed in FY 1986, and the development and testing of the prototype(s), as well as the engineering specifications were completed in FY 1987. Operational airport tests of the prototypes, on-going refinement of the detection software, and an investigation of alternate neutron sources will occur in FY 1988. A breadboard chemiluminescent vapor detector to identify concealed explosives on people was completed in FY 1986 and efforts to integrate it into a portal screening system continued. The prototype vapor screening portal will be completed and tested at airports in FY 1988. A prototye vapor screening system for carry on will be completed in late FY 1988, as well.

New Technology Investigations.—Under new technology investigations, feasibility studies on a wide range of explosive detection technologies for all the screening applications were initiated in FY 1985 and FY 1986. In FY 1987 hardware developmental efforts continued on the most promising of these technologies. In FY 1988 breadboard hardware from some of these efforts will become available for testing at airports. The most promising combines multiple sensors and an expert expert systems approach to identify explosive threats.

Blasting Cap Additive.—In FY 1987 a joint FAA/explosives industry effort on enhanced bomb detection reached a decision point on the feasibility of the additive approach. In FY 1988, the program will continue into development of a breadboard detection system, as well as, studies on the potential impact on industrial manufacturing processes.

Concourse Security.—In FY 1986 feasibility investigations on various concourse screening approaches were initiated. Areas included flammables detection, enhanced metal detection, and non-metallic weapons detection for screening people, and computer assisted detection of weapons and explosives in baggage. These investigations continued in FY 1987, with some projects entering a hardware development phase. In FY 1988, efforts will continue to develop prototype systems based upon approaches which appear promising.

System Integration.—In preceding years efforts have continued on various aspects of physical security, including the optimal placement of newly developed security systems and the reconciliation of passengers and checked baggage. In FY 1988 efforts will continue in those areas deemed high priority by the FAA operational security elements. These will include operational evaluation of an automated reconciliation system, investigation of methods to reduce aircraft vulnerability to hijacking and sabotage, and evaluations of physical security systems and devices developed by other Federal agencies.

Benefits:

New security systems will effectively and efficiently detect explosives and weapons in order to prevent criminal acts in the civil air transportation system. They will substantially enhance the capabilities available today. Current security procedures are labor intensive and relatively expensive. Research on effective and cost beneficial systems continues so that the appropriate security response to an increased level of terrorism can be promptly implemented. It is necessary to develop this capability to prevent the paralysis of the U.S. air transportation system should terrorism become rampant.

7. ENVIRONMENT FY '88: $3,000,000; '89: $2,600,000

This activity carries out the agency's statutory mandates to develop and operate an efficient air transportation system, through minimization of the environmental consequences of and constraints on civil aviation.

Program Title: *20 Environment*

Basis for Authorization:

This program provides the technical bases and economic justifications for regulatory controls and technical guidance and assistance for civil aviation environmental protection. If the agency is to continue to provide an efficient system of air transportation for our nation to meet present and future needs, unnecessary constraints must be minimized. Demands for environmental protection by airport neighbors continue to present potential constraints. Careful analysis and guidance are important to insure that any environmental limitations are meaningful, are not unduly burdensome to any element of the economy, and are consistent with national needs for air transportation. Beyond these requirements, the environmental program also maintains the technical support and guidance needed to support agency activities by providing required environmental impact assessments for proposed agency actions and by controlling the effects of any toxic substances at agency facilities.

Description of Solution:

Environmental effects continue to present a major constraint to the efficient operation of the national air transportation system. FAA has a statutory mandate to protect the public health and welfare from aviation noise and sonic boom, aircraft engine emissions, and other environmental effects. FAA standards, and regulations required by statute must be consistent with the highest degree of flight safety, and should be economically reasonable, technologically practicable, and appropriate to the type of equipment affected. Careful and detailed analyses are required prior to the promulgation or amendment of each environmental regulation to satisfy these factors. Although past emphasis has been placed largely on the control and reduction of noise and emissions at the source (the aircraft itself), other approaches must be used to complement regulatory standards, including detailed airport land-use compatibility planning and economic incentives to minimize the residual noise and emissions which can never be completely eliminated.

The elements included in this program are:

Aircraft Noise Reduction and Control
Aircraft Engine Emissions Reduction and Control
Aviation Fuel Conservation
Fuel Shortage Contingency Planning

Specific information is set forth on the following pages addressing this program request.

Appropriation Summary.—Appropriation history for each program item requested is identified on the following pages.

Cost Estimate.—Cost estimates of work to be funded this year and the outyears are included in the following pages.

Program Element Title: Aircraft Noise Reduction and Control

Basis for Authorization:

This program element reduces noise effects of civil aviation by controlling noise generated at the source (the aircraft), by developing effective noise abatement operating procedures, and by supporting compatible land use adjacent to airports. Aircraft noise standards and regulations are developed and implemented, consistent with aviation safety, economic reasonableness, and technical feasibility. Work is conducted to improve understanding of noise-generation phenomena and to improve state-of-technology in noise reduction. This program element also provides FAA policies and procedures to meet the requirements of the National Environmental Policy Act in assessing the environmental consequences of proposed agency actions.

Description of Solution:

Noise standards for all types of civil aircraft are continually reviewed and revised to reflect the best available noise reduction technology, consistent with safety and economic reasonableness. The implementation of new noise standards for rotorcraft and small propeller-driven airplanes will be monitored carefully to assure their relevance and effectiveness. Existing procedures for assessing airport noise compatibility with surrounding land uses will be reviewed and improved, along with the technical means, such as the FAA's Integrated Noise Model, for evaluating the extent of incompatibility. Cooperative efforts with other agencies will continue to insure a common Federal and International understanding of the effects of available noise.

Benefits:

This program element carries out agency statutory duties to control aircraft noise and sonic boom in order to protect the public health and welfare, and to implement some two dozen other environmentally protective laws and Executive Orders.

Program Element Title: Aircraft Engine Emissions Reduction and Control

Basis for Authorization:

This program element accomplishes two primary objectives. It reduces air pollution associated with gaseous emissions from aircraft and airport systems, consistent with aviation safety, economic reasonableness, and technical feasibility. Emissions are monitored and assessed both in the airport environs and in the upper atmosphere, to evaluate and reduce their levels, if necessary, to protect the public health and welfare. This program also protects the aircraft interior environment from contamination due to radiation or trace atmospheric gases, such as ozone, which could harm passengers and crew.

Description of Solution:

By statute, aircraft engine emissions standards are established by the U.S. Environmental Protection Agency and are enforced and continuously evaluated for relevancy by FAA. This program element provides the Federal focus for aviation concerns over air quality, both at airports and at cruise altitudes. This program element also develops and implements the statutory requirements of the National Environmental Policy Act to assess potential effects on airport air quality due to proposed changes in airport layout or use. As a spinoff of these efforts, potential effects of radiation and atmospheric trace gases are monitored to protect aircraft passengers and crews at cruise altitudes.

Benefits:

This program element provides the technical knowledge and capability to protect the public health and welfare from air pollutants caused by civil aviation, through limiting pollutants at the source (the aircraft engines) and assessing aviation's effects on air quality throughout the air transportation system.

Program Element Title: Aviation Fuel Conservation

Basis for Authorization:

This program element will facilitate aircarft oprations for both the users and the air traffic control system by developing ways to minimize fuel consumption and improve ATC designs and procedures. The principle products are new technologies that are being developed specifically for FAA missions and that will be used by FAA in creating fuel-efficient and time-efficient systems of airports, airways, and procedures.

Description of Solution:

A computationally efficient algorithm for predicting the total energy consumption of aircraft oprations on the ground and in flight will be developed. the algorithm will predict the energy consumption in a flight for any given aircraft flight performance, load characteristics, and oprating conditions. It will compute optimum fuel-efficient flight trajectories that will meet specific route, altitude, and time constraints imposed by the ATC system. These trajectories will be capable of being redefined dynamically as required by the changing winds, weather, and ATC constraints. Algorithms will be developed to be incorporated in onboard flight management systems for real time fuel-efficient trajectory computations; these algorithms will also be available to the airlines for fuel-efficient flight planning and to the FAA for reducing the fuel consumption of its own aircraft. Compatible software will be developed for ATC so that appropriate elements of the ATC automation system may generate fuel-efficient route and altitude or speed advisories to aircraft without onboard avionics. This capability will be offered to oceanic ASTC to generate and control a fuel-efficient track system that can respond dynamically to wind, weather, and traffic load conditions, it will also be applied to rotorcraft operations in low-altitude, offshore, and remote areas to produce fuel-efficient routes and airspace designs for rotorcraft operations.

A computer hardware and software system will be developed for simulating airport and airspace delay reduction, capacity improvement, and fuel efficiency. The computer program called SIMMOD, will be used to analyze and evaluate complex airport and airspace traffic conditions and procedures. Based on this analysis, modified airport and airspace procedures will be developed that will improve the fuel-efficiency of aircraft operations without having an adverse impact on airport capacity and delays.

Benefits:

This program element responds to statutory requirements for the FAA to assure efficient use of the airspace and to assess the impact on energy efficiency and energy conservation of major FAA actions. It will lead to significant improvement in fuel consumption by all elements of civil aviation.

Program Element Title: Fuel Shortage Contingency Planning

Basis for Authorization:

This program element provides the ability to assess the impact of a distruption in oil supply on air transportation. It includes a means of developing and testing appropriate FAA policy options for response to fuel emergencies. FAA management will be provided a quantitative description of probable aviation fuel supply over time for specified supply disruptions. Management will also be able to examine the results of various approaches to alleviate impacts of the emergency.

Description of Solution:

Research will determine mathematical and statistical algorithms for a national Oil Shortage Analysis Model (NOSAM). Further research will establish a database covering national fuel supply and consumption. The model will quantify effects of data in terms of national economic and aviation indicators. This information will then be used to develop policy options and to determine the benefits or impacts of the options. In order to make objective decisions that effect the National Airspace System, it will be necessary to consider such options as regulation of private stock, allocation of supplies, drawdown of the Strategic Petroleum Reserve (SPR), implementation of emergency ATC procedures, imposition of slot allocation, and use of flight plan optimization.

Procedures to maintain essential air service during an aviation fuel shortage are being identified. These procedures will be evaluated in the development of the policy options associated with NOSAM to ensure the maintenance of maximum possible levels of air service. Development is needed of special databases to identify and locate key industry and government personnel during an emergency, and to track FAA regional fuel prices. Databases covering fuel prices and availability nationwide will continue to be developed.

The NOSAM system will be tested thoroughly by imposing hypothetical oil supply disruption scenarios on the aviation system. These studies will be used to identify areas of needed improvement to the model, which will then be modified and retested.

Benefits:

This program element responds to the requirements of the Energy Emergency Preparedness Act by supporting aviation emergency contingency planning to deal with hypothetical or actual fuel shortages in aviation. The resulting model and databases will be maintained and improved for changing world oil conditions and aviation fuel requirements so that the FAA can respond quickly and effectively in an emergency.

V. SECTIONAL ANALYSIS

A BILL To amend the Airport and Airway Improvement Act of 1982 for the purpose of extending the authorization of appropriations for airport and airway improvements, and for other purposes

Section 2(b):

(1) amends Section 506(b) of the Airport and Airway Improvement Act of 1982 to read:

(b) RESEACH, ENGINEERING AND DEVELOPMENT, AND DEMONSTRATIONS.—

(1) DEMONSTRATION PROJECTS.—The Secretary is authorized to carry out under section 312 of the Federal Aviation Act of 1958 (49 U.S.C. App. 1353) such demonstration projects as the Secretary determines necessary in connection with research and development activities under such section.

(2) GENERAL AUTHORIZATION.—For research, engineering and development, and demonstration projects and activities under section 312 of the Federal Aviation Act of 1958 and paragraph (1) of this subsection, there is authorized to be appropriated from the Trust Fund—

(A) for fiscal year 1988—

(i) $127,192,000 solely for air traffic control projects and activities;

(ii) $7,743,000 solely for air traffic control advanced computer projects and activities;

(iii) $9,818,000 solely for navigation projects and activities;

(iv) $21,957,000 solely for aviation weather projects and activities;

(v) $6,307,000 solely for aviation medicine projects and activities;

(vi) $24,988,000 solely for aircraft safety projects and activities; and

(vii) $3,000,000 solely for environmental projects and activities; and

(B) for fiscal year 1989—

(i) $135,866,000 solely for air traffic control projects and activities;

(ii) $15,716,000 solely for air traffic control advanced computer projects and activities;

(iii) $11,395,000 solely for navigation projects and activities;

(iv) $21,797,000 solely for aviation weather projects and activities;

(v) $6,613,000 solely for aviation medicine projects and activities;

(vi) $21,013,000 solely for aircraft safety projects and activities; and

(vii) $2,600,000 solely for environmental projects and activities;

(3) AUTHORITY TO TRANSFER FUNDS.—

(A) UNLIMITED.—Funds may be transferred among the projects and activities listed in paragraph (2), except that the net funds transferred to or from any category of such projects and activities listed in paragraph (2) in any fiscal year may not exceed 10 percent of the amount authorized for such category by paragraph (2) for such fiscal year.

(B) AFTER NOTICE.—In addition, the Secretary may propose transfers to or from any category of projects and activities listed in paragraph (2) exceeding 10 percent of the amount authorized for such category. An explanation of the proposed transfer must be transmitted in writing to the Committee on Science, Space, and Technology and the Committee on Appropriations of the House of Representatives and the Committee on Commerce, Science, and Transportation and the Committee on Appropriations of the Senate. The proposed transfer may be made only when—

(i) 30 calendar days have passed after transmission of such explanation; or

(ii) each such Committee has transmitted to the Secretary written notice that such Committee has no objection to the proposed transfer.

(4) MINIMUM EXPENDITURES FOR ENHANCING AIRPORT CAPACITY.—

(A) GENERAL RULE.—Notwithstanding any other provision of this subsection, of funds made available under paragraph (2) in each fiscal years 1988 and 1989, not less than $25,000,000 per fiscal year shall be expended for research and development on preserving and enhancing airport capacity (including research and development on improvements to airport design standards, airport maintenance, airpoirt safety, airport operations, and airport environmental concerns) under section 312 of the Federal Aviation Act of 1958.

(B) REPORT.—Not later than 60 days after the last day of each of fiscal years 1988 and 1989, the Administrator of the Federal Aviation Administration shall transmit to the Committee on Science, Space, and Technology and the Committee on Public Works and Transportation of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report demonstrating that the Administrator has complied with subparagraph (A) in such fiscal year.

(5) PERIOD OF AVAILABILITY.—Amounts appropriated under this subsection shall remain available until expended; and

(2) states that the amendment made by paragraph (1) shall take effect October 1, 1987.

VI. COST AND BUDGET DATA

Fiscal year:	
1988	$201,005,000
1989	215,000,000
1990	222,000,000
1991	230,000,000
1992	238,000,000

VII. EFFECT OF LEGISLATION ON INFLATION

In accordance with Rule XI, Clause 2(l)(4) of the Rules of the House of Representatives, the legislation is assessed to have no adverse inflationary effects on prices and costs in the operations of the national economy. A large portion of the FAA expenses are labor intensive and spending is directly related to jobs and materials. The long run economic effect of FAA expenditures for research, engineering and development is to increase productivity and reduce delays at the Nation's airports and thereby reduce the amount of fuel used in the national aviation system.

VIII. CHANGES IN EXISTING LAW MADE BY THE BILL, AS REPORTED

In compliance with clause 3 of rule XIII of the Rules of the House of Representatives, changes in existing law made by the bill, as reported, are shown as follows (existing law proposed to be omitted is enclosed in black brackets, new matter is printed in italic, existing law in which no change is proposed is shown in roman):

AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982

* * * * * * *

SEC. 502. DECLARATION OF POLICY.

(a) IN GENERAL.—The Congress hereby finds and declares that—

(1) * * *

* * * * * * *

(4) this title should be administered in a manner consistent with a comprehensive airspace system plan to maximize the use of safety facilities, with highest priority for commercial service airports, including but not limited to, the goal of installing, operating, and maintaining, to the extent possible under available funds and given other safety needs, a precision approach system, *a vertical visual guidance system,* and a full approach light system for each primary runway, grooving, or friction treatment of all primary and secondary runways, a nonprecision instrument approach for all secondary runways, runway end identifier lighs on all runways that do not have an approach light system, electronic or visual vertical guidance on all runways, *distance-to-go signs for each primary and secondary runway, a surface movement radar system at each catetory III airport, a taxiway lighting and sign system,* runway edge lighting and marking, and radar approach coverage for all airport terminal areas;

* * * * * * *

(8) the Federal administrative requirements placed upon airport sponsors can be reduced and simplified through the use of a single project application to cover all airport improvement projects contained in the airport's annual expenditure program; **[**and**]**

(9) it is in the national interest to develop in metropolitan areas an integrated system of airports designed to provide expeditious access and maximum safety**[**.**]** *; and*

(10) artificial restrictions on airport capacity are not in the public interest and should not be imposed to alleviate air traffic delays unless other reasonably available and less burdensome alternatives have first been attempted.

* * * * * * *

SEC. 503. DEFINITIONS.

(a) IN GENERAL.—As used in this title—

(1) "Airport" *(A)* means any area of land or water which is used, or intended for use, for the landing and takeoff of aircraft, and any appurtenant areas which are used, or intended for use, for airport buildings or other airport facilities or rights-of-way, together will all airport buildings and facilities located thereon*; and (B) includes any heliport.*

* * * * * * *

(9) "Landed weight" means the weight of aircraft providing scheduled and nonscheduled service of only property (including mail) in intrastate, interstate, and foreign air transportation, as shall be determined by the Secretary pursuant to such regulations as the Secretary may prescribe.

[(9)**]** *(10)* "Passengers enplaned" means domestic, territorial, and international revenue passenger enplanements in the States in scheduled and nonscheduled service of aircraft in intrastate, interstate, and foreign commerce as shall be determined by the Secretary pursuant to such regulations as the Secretary may prescribe.

[(10)**]** *(11)* "Planning agency" means any planning agency designated by the Secretary which is authorized by the laws of the State or States or political subdivisions concerned to engage in areawide planning for the areas in which assistance under this title is to be used.

[(11)**]** *(12)* "Primary airport" means a commercial service airport which is determined by the Secretary to have .01 percent or more of the total number of passengers enplaned annually at all commercial service airports.

[(12)**]** *(13)* "Project" means a project (or separate projects submitted together) for the accomplishment of airport development or airport planning, including the combined submission of all projects which are to be undertaken at an airport in a fiscal year.

[(13)**]** *(14)* "Project costs" means any costs involved in accomplishing a project.

[(14)**]** *(15)* "Project grant" means a grant of funds by the Secretary to a sponsor for the accomplishment of one or more projects.

[(15)] *(16)* "Public agency" means a state or any agency of a State, a municipality or other political subdivision of a State, a tax-supported organization, or an Indian tribe or pueblo.

[(16)] *(17)* "Public airport" means any airport which is used or to be used for public purposes, under the control of a public agency, the landing area of which is publicly owned.

[(17)] *(18)* "Public-use airport" means—

(A) any public airport,

(B) any privately owned reliever airport, and

(C) any privately owned airport which is determined by the Secretary to enplane annually 2,500 or more passengers and receive scheduled passenger service of aircraft,

which is used or to be used for public purposes.

[(18)] *(19)* "Reliever airport" means an airport designated by the Secretary as having the function of relieving congestion at a commercial service airport and providing more general aviation access to the overall community.

[(19)] *(20)* "Reliever heliport" means a heliport designated by the Secretary as having the function of relieving congestion at a commercial service airport, by means of diverting potential fixed-wing enplaned passengers to helicopter carriers.

[(20)] *(21)* "Secretary" means the Secretary of Transportation.

[(21)] *(22)* "Sponsor" means (A) any public agency which, either individually or jointly with one or more other public agencies, submits to the Secretary, in accordance with this title, an application for financial assistance, and (B) any private owner of a public-use airport who submits to the Secretary, in accordance with this title, an application for financial assistance for such airport.

[(22)] *(23)* "State" means a State of the United States, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, American Samoa, the Government of the Northern Mariana Islands, the Trust Territory of the Pacific Islands, and Guam.

[(23)] *(24)* "Trust Fund" means the Airport and Airway Trust Fund established by section 9502 of the Internal Revenue Code of 1954.

[(24)] *(25)* "United States share" means that portion of the project costs of projects for airport development or airport planning approved pursuant to section 509 of this title which is to be paid from funds made available for the purposes of this title.

* * * * * * *

SEC. 505. AIRPORT IMPROVEMENT PROGRAM.

(a) AIRPORT DEVELOPMENT AND AIRPORT PLANNING.—In order to maintain a safe and efficient nationwide system of public-use airports to meet the present and future needs of civil aeronautics, the Secretary is authorized to make grants from the Trust Fund for airport development and airport planning by project grants in accordance with the provisions of this title. [The aggregate amounts which shall be available after September 30, 1981, to the Secretary for such grants and for grants for airport noise compatibility planning under section 103(b) of the Aviation Safety and Noise Abatement Act of 1979 and for carrying out noise compatibility programs or parts thereof under section 104(c) of such Act shall be $450,000,000 for fiscal year 1982; $1,250,000,000 of which $200,000,000 shall be credited to the supplementary discretionary fund established by paragraph (3)(B) of section 507(a) of this title for the fiscal years ending before October 1, 1983; $2,243,500,000, of which $400,000,000 shall be credited to such fund for the fiscal years ending before October 1, 1984; $3,230,500,000, of which $475,000,000 shall be credited to such fund for the fiscal years ending before October 1, 1985; $4,247,500,000, of which $475,000,000 shall be credited to such fund for the fiscal years ending before October 1, 1986; and $5,264,700,000 of which $475,000,000 shall be credited to such fund for the fiscal years ending before October 1, 1987.] *The aggregate amounts which shall be available after September 30, 1981, to the Secretary for such grants and for grants for airport noise compatibility planning under section 103(b) of the Aviation Safety and Noise Abatement Act of 1979 and for carrying out noise compatibility programs or parts thereof under section 104(c) of such ~~Act~~ shall be $5,116,700,000 of which $475,000,000 shall be credited to the supplementary discretionary fund established by section 507(a)(3)(B) for fiscal year ending before October 1, 1987, $6,836,700,000 for fiscal years ending before October 1, 1988, $8,556,700,000 for fiscal years ending before October 1, 1989, $10,255,700,000 for fiscal years ending before October 1, 1990, $12,015,700,000 for fiscal years ending before October 1, 1991, and $13,727,700,000 for fiscal years ending before October 1, 1992.* Those amounts credited to the supplementary discretionary fund pursuant to this subsection shall not be subject to any of the apportionments or distributions set forth in sections 507(a)(1), [(2), (3)(A), or] *507(a)(2), 507(a)(3), 507(c), and* 508(d) of this title.

* * * * * * *

[(c) NOISE ABATEMENT PROJECTS TO BE CONSIDERED AS AIRPORT DEVELOPMENT FOR FISCAL YEAR 1982.—For purposes of amounts apportioned for fiscal year 1982, airport development shall be considered to include any of the following activities, if undertaken by the sponsor, owner, or operator of a public-use airport:

[(1) any acquisition or installation of the following items for improving noise compatibility at a public-use airport:

[(A) noise suppressing equipment, physical barriers, or landscaping, for the purpose of diminishing the effect of aircraft noise on any areas adjacent to such airport; and

[(B) land, including land associated with future airport development, or any interest therein, or any easement through or other interest in airspace, necessary to insure that such land is used only for purposes which are compatible with the noise levels attributable to the operation of such airport; and

[(2) any project to carry out an approved airport noise compatibility program, or part thereof, approved by the Secretary pursuant to section 104(b) of the Aviation Safety and Noise Abatement Act of 1979.]

(c) Noise Abatement Reasonable Progress Requirement.—If the Secretary finds that the sponsor, owner, or operator of a public-use airport which is to receive funds made available under this section in a fiscal year is not making reasonable progress towards development and implementation of a noise compatibility program under section 104 of the Aviation Safety and Noise Abatement Act of 1979 at such airport, the Secretary shall make available 10 percent of the funds to be apportioned, with respect to such airport in such fiscal year to units of local government and public agencies in the area surrounding such airport for grants under subsection (c) of such section 104 for carrying out—

(1) a noise compatibility program or parts thereof with respect to such airport; or

(2) in any case in which such a program has not been approved under such Act with respect to such airport, a project with respect to such airport which would be eligible for funding under such Act if such a program were so approved.

SEC. 506. AIRWAY IMPROVEMENT PROGRAM

(a) Airway Facilities and Equipment.—[For the purposes of acquiring, establishing, and improving air navigation facilities under section 307(b) of the Federal Aviation Act of 1958 (49 U.S.C. 1348(b)), there is authorized to be appropriated from the Trust Fund for fiscal years beginning after September 30, 1981, aggregate amounts not to exceed $261,000,000 for fiscal year 1982; $986,000,000 for the fiscal years ending before October 1, 1983; $2,379,000,000 for the fiscal years ending before October 1, 1984; $3,786,000,000 for the fiscal years ending before October 1, 1985; $5,163,000,000 for the fiscal years ending before October 1, 1986; and $6,327,000,000 for the fiscal years ending before October 1, 1987. Amounts appropriated under the authorizations in this subsection shall remain available until expended.]

(1) General authorization.—For the purposes of acquiring, establishing, and improving air navigation facilities under section 307(b) of the Federal Aviation Act of 1958 (49 U.S.C. App. 1348(b)), there is authorized to be appropriated from the Trust Fund for fiscal years beginning after September 30, 1981, aggregate amounts not to exceed $6,327,000,000 for fiscal years ending before October 1, 1987, $7,704,000,000 for fiscal years ending before October 1, 1988, $9,434,000,000 for fiscal years ending before October 1, 1989, $11,625,200,000 for fiscal years ending before October 1, 1990, $13,615,200,000 for fiscal years ending before October 1, 1991, and $15,653,500,000 for fiscal years ending before October 1, 1992. Amounts appropriated under this subsection shall remain available until expended.

(2) Purchase and installation of instrument landing systems.—

(A) Minimum obligation level.—Of amounts made available under paragraph (1) after September 30, 1987, the Secretary shall obligate not less than $27,000,000 in fiscal year 1988, $30,000,000 in fiscal year 1989, and $35,000,000 in fiscal year 1990 for the purposes of purchasing and installing instrument landing systems at airports under section 307(b) of the Federal Aviation Act of 1958.

(B) PRIMARY AND RELIEVER AIRPORTS.—*75 percent of amounts obligated pursuant to subparagraph (A) in a fiscal year shall be made available for the purchase and installation of instrument landing systems at primary airports and reliever airports.*

(C) OTHER AIRPORTS.—*25 percent of amounts obligated pursuant to subparagraph (A) in a fiscal year shall be made available for the purchase and installation of instrument landing systems at airports other than primary airports and reliever airports.*

[(2)**]** *(3)* SITE PREPARATION WORK.—The costs of site preparation work associated with acquisition, establishment, or improvement of air navigation facilities by the Secretary pursuant to section 307(b) of the Federal Aviation Act of 1958 shall be charged to appropriated funds available to the Secretary for that purpose pursuant to paragraph (1) of this subsection. Nothing in this title shall preclude the Secretary from providing in a grant agreement or other agreement with an airport owner or sponsor, for the performance of such site preparation work in connection with airport development, subject to payment or reimbursement for such site preparation work by the Secretary from such appropriated funds.

[(b) RESEARCH, ENGINEERING AND DEVELOPMENT, AND DEMONSTRATIONS.—The Secretary is authorized to carry out under section 312 (49 U.S.C. 1353) of the Federal Aviation Act of 1958 such demonstration projects as the Secretary determines necessary in connection with research and development activities under section 312. For research, engineering and development, and demonstration projects and activities under section 312, there is authorized to be appropriated from the Trust Fund $72,000,000 for fiscal year 1982; $134,000,000 for fiscal year 1983 (of which not more than $16,800,000 is authorized to be appropriated for facilities, engineering and development); $286,000,000 for fiscal year 1984 (of which not more than $24,700,000 is authorized to be appropriated for facilities, engineering and development); $269,000,000 for fiscal year 1985 (of which not more than $23,100,000 is authorized to be appropriated for facilities, engineering and development); $215,000,000 for fiscal year 1986 (of which not more than $22,700,000 is authorized to be appropriated for facilities, engineering and development); and $193,000,000 for fiscal year 1987 (of which not more than $22,000,000 is authorized to be appropriated for facilities, engineering and development). Amounts appropriated under the authorizations in this subsection shall remain available until expended.**]**

(b) RESEARCH, ENGINEERING AND DEVELOPMENT, AND DEMONSTRATIONS.—

(1) DEMONSTRATION PROJECTS.—The Secretary is authorized to carry out under section 312 of the Federal Aviation Act of 1958 (49 U.S.C App. 1353) such demonstration projects as the Secretary determines necessary in connection with research and development activities under such section.

(2) GENERAL AUTHORIZATION.—For research, engineering and development, and demonstration projects and activities under section 312 of the Federal Aviation Act of 1958 and paragraph

(1) of this subsection, there is authorized to be appropriated from the Trust Fund—

(A) for fiscal year 1988—

(i) $127,192,000 solely for air traffic control projects and activities;

(ii) $7,743,000 solely for air traffic control advanced computer projects and activities;

(iii) $9,818,000 solely for navigation projects and activities;

(iv) $21,957,000 solely for aviation weather projects and activities;

(v) $6,307,000 solely for aviation medicine projects and activities;

(vi) $24,988,000 solely for aircraft safety projects and activities; and

(vii) $3,000,000 solely for environmental projects and activities; and

(B) for fiscal year 1989—

(i) $135,866,000 solely for air traffic control projects and activities;

(ii) $15,716,000 solely for air traffic control advanced computer projects and activities;

(iii) $11,395,000 solely for navigation projects and activities;

(iv) $21,797,000 solely for aviation weather projects and activities;

(v) $6,613,000 solely for aviation medicine projects and activities;

(vi) $21,013,000 solely for aircraft safety projects and activities; and

(vii) $2,600,000 solely for environmental projects and activities.

(3) AUTHORITY TO TRANSFER FUNDS.—

(A) UNLIMITED.—Funds may be transferred among the projects and activities listed in paragraph (2), except that the net funds transferred to or from any category of such projects and activities listed in paragraph (2) in any fiscal year may not exceed 10 percent of the amount authorized for such category by paragraph (2) for such fiscal year.

(B) AFTER NOTICE.—In addition, the Secretary may propose transfers to or from any category of projects and activities listed in paragraph (2) exceeding 10 percent of the amount authorized for such category. An explanation of the proposed transfer must be transmitted in writing to the Committee on Science, Space, and Technology and the Committee on Appropriations of the House of Representatives and the Committee on Commerce, Science, and Transportation and the Committee on Appropriations of the Senate. The proposed transfer may be made only when—

(i) 30 calendar days have passed after transmission of such explanation; or

(ii) each such Committee has transmitted to the Secretary written notice that such Committee has no objection to the proposed transfer.

(4) MINIMUM EXPENDITURES FOR ENHANCING AIRPORT CAPACITY.—

(A) GENERAL RULE.—Notwithstanding any other provision of this subsection, of funds made available under paragraph (2) in each of fiscal years 1988 and 1989, not less than $25,000,000 per fiscal year shall be expended for research and development on preserving and enhancing airport capacity (including research and development on improvements to airport design standards, airport maintenance, airport safety, airport operations, and airport environmental concerns) under section 312 of the Federal Aviation Act of 1958.

(B) REPORT.—Not later than 60 days after the last day of each of fiscal years 1988 and 1989, the Administrator of the Federal Aviation Administration shall transmit to the Committee on Science, Space, and Technology and the Committee on Public Works and Transportation of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report demonstrating that the Administrator has complied with subparagraph (A) in such fiscal year.

(5) PERIOD OF AVAILABILITY.—Amounts appropriated under this subsection shall remain available until expended.

(c) OTHER EXPENSES.—

(1) **[**The balance**]** *DESCRIPTION.—Subject to paragraph (3)(C) of this subsection, the balance* of the moneys available in the Trust Fund may be appropriated for (A) costs of services provided under international agreements relating to the joint financing of air navigation services which are assessed against the United States Government, and (B) direct costs incurred by the Secretary to flight check, operate, and maintain air navigation facilities referred to in subsection (a) of this section in a safe and efficient manner.

(2) *FISCAL YEARS 1982–1987.*—The amount appropriated from the Trust Fund for the purposes of clauses (A) and (B) of paragraph (1) of this subsection for fiscal year 1982 may not exceed $800,000,000, and for any fiscal year beginning after September 30, 1982, and ending before October 1, 1987, may not exceed the amount made available for purposes of section 505 for that fiscal year multiplied by a factor equal to 1.83 in the case of fiscal year 1983; 1.25 in the case of fiscal year 1984; 1.28 in the case of fiscal year 1985; 1.28 in the case of fiscal year 1986; and 1.34 in the case of fiscal year 1987. The amount authorized to be appropriated from the Trust Fund under this paragraph for any fiscal year shall be reduced by an amount equal to two times the excess, if any, of (A) the portion of the amount authorized to be appropriated under subsection (a) of this section for such fiscal year which was not authorized to be appropriated for any previous fiscal year, over (B) the amount appropriated under such subsection for such fiscal year.

(3) FISCAL YEARS 1988–1992.—

(A) MAXIMUM AMOUNT APPROPRIATED.—Subject to subparagraph (B) of this paragraph, the amount appropriated from the Trust Fund for the purposes of clauses (A) and (B)

of paragraph (1) of this subsection for each of fiscal years 1988, 1989, 1990, 1991, and 1992 may not exceed 50 percent of the amount of funds made available under section 505 and subsections (a) and (b) of this section for such fiscal year.

(B) REDUCTION IN MAXIMUM AMOUNT.—The maximum amount which may be appropriated from the Trust Fund for the purposes of clauses (A) and (B) of paragraph (1) for any fiscal year, as determined under subparagraph (A) of this paragraph, shall be reduced by an amount equal to 3 times the excess, if any, of—

(i) $3,297,000,000 in the case of fiscal year 1988, $3,450,000,000 in the case of fiscal year 1989, $3,840,000,000 in the case of fiscal year 1990, $3,700,000,000 in the case of fiscal year 1991, and $3,650,000,000 in the case of fiscal year 1992, over

(ii) the amount appropriated under section 505 and subsections (a) and (b) of this section for such fiscal year.

(C) TRANSFER OF REDUCED FUNDS TO DISCRETIONARY FUND.—If the maximum amount which may be appropriated from the Trust Fund for the purposes of clauses (A) and (B) of paragraph (1) for any fiscal year is reduced under subparagraph (B), there shall be available from the Trust Fund for such fiscal year and thereafter to the Secretary for making grants at the discretion of the Secretary for the purposes described in section 507(c)(2) an amount equal to the amount of such reduction.

(d) WEATHER SERVICES.—The Secretary is authorized to reimburse the National Oceanic and Atmospheric Administration from the funds authorized in subsection (c) for fiscal years beginning after September 30, 1982, for the cost of providing the Federal Aviation Administration with weather reporting services. Expenditures for the purposes of carrying out this subsection shall be limited to [$26,700,000 for fiscal year 1983; $28,569,000 for fiscal year 1984; $30,569,000 for fiscal year 1985; $32,709,000 for fiscal year 1986; and] $34,998,000 for fiscal year 1987 *and $30,000,000 per fiscal year for each of fiscal years 1988, 1989, 1990, 1991, and 1992.*

(e) PRESERVATION OF FUNDS AND PRIORITY FOR AIRPORT AND AIRWAY PROGRAMS.—(1) Notwithstanding any other provision of law to the contrary, no amounts may be appropriated from the Trust Fund to carry out any program or activity under the Federal Aviation Act of 1958, except programs or activities referred to in this section *and section 505.*

(2) Amounts equal to the amounts authorized for each fiscal year by section 505 of this title and subsections (a), (b), and (d) and the [third sentence of section (c)] *second sentence of subsection (c)(2)* of this section remain available in the Trust Fund until appropriated for the purposes described in such subsections.

* * * * * * *

(5) No provision of law shall be construed as authorizing the Secretary to obligate or expend any amounts appropriated from the Trust Fund for the purposes described in subsection (c) in any fiscal

year after September 30, [1987,] *1992,* unless the provision expressly amends the provisions of and the formulas in subsection (c) of this section.

* * * * * * *

[SEC. 507. APPORTIONMENT OF FUNDS.

[(a) APPORTIONMENT.—On the first day of each fiscal year for which any amount is authorized to be obligated for the purposes of section 505 of this title, the amount made available for that year under such section and not previously apportioned shall be apportioned by the Secretary as follows:

[(1) PRIMARY AIRPORTS.—

[(A) To the sponsor of each primary airport, as follows:

[(i) $6 for each of the first fifty thousand passengers enplaned at that airport;

[(ii) $4 for each of the next fifty thousand passengers enplaned at that airport;

[(iii) $2 for each of the next four hundred thousand passengers enplaned at that airport; and

[(iv) $0.50 for each additional passenger enplaned at that airport.

[(B) In each of the fiscal years 1984 through 1987, the Secretary shall apportion an amount to the sponsor of each primary airport in addition to whatever amount is apportioned to such airport under the formula set forth in subparagraph (A). The additional apportionment shall be calculated by determining the amount such airport is to be apportioned under the formula in subparagraph (A) and then increasing that amount by 10 percent for fiscal year 1984, 20 percent for fiscal year 1985, 25 percent for fiscal year 1986, and 30 percent for fiscal year 1987.

[(C) The Secretary shall not apportion less than $200,000 nor more than $12,500,000 under this paragraph to an airport sponsor for any primary airport for any fiscal year.

[(D) In no event shall the total amount of all apportionments under this paragraph for any fiscal year exceed 50 percent of the amount authorized to be obligated for such fiscal year for the purposes of section 505 of this title. In any case in which an apportionment would be reduced by the preceding sentence, the Secretary shall for such fiscal year reduce the apportionment to each sponsor of a primary airport under this paragraph proportionately so that such 50 percent amount is achieved.

[(E) If any Act of Congress has the effect of limiting or reducing the amount authorized or available to be obligated for any fiscal year for the purposes of section 505 of this title, the total amount of all apportionments under this paragraph for such fiscal year shall not exceed 50 percent of such limited or reduced amounts. In any case in which an apportionment would be reduced by the preceding sentence, the Secretary, after complying with the provisions of paragraph (3)(B) of this subsection, shall for such fiscal year reduce the apportionment to each sponsor of a primary airport under this paragraph proportionately so that such 50 percent amount is achieved.

[(2) APPORTIONMENTS TO STATES.—To the States, there shall be apportioned for each of the fiscal years beginning after September 30, 1981, and ending before October 1, 1987, 12 percent of the amount made available under section 505 for such fiscal year, as follows:

[(A) INSULAR AREAS.—For airports other than primary airports, one percent of such amounts to Guam, American Samoa, the Government of the Northern Mariana Islands, the Trust Territory of the Pacific Islands, and the Virgin Islands.

[(B) STATES.—For airports other than primary airports and other than airports described in section 508(d)(3), one-half of the remaining 99 per centum to the States (other than those to which subparagraph (A) of this paragraph applies) in the proportion which the population of each such State bears to the total population of all such States and one-half of the remaining 99 per centum to the States (other than those to which subparagraph (A) of this paragraph applies) in the proportion which the area of each such State bears to the total area of all such States. As used in this paragraph, the term "population" means the population according to the latest decennial census of the United States and the term "area" includes both land and water.

[(3) DISCRETIONARY FUND.—(A) Any amounts not apportioned under paragraphs (1), (2), and (4) of this subsection shall constitute a discretionary fund to be distributed at the discretion of the Secretary (subject to the limitations set forth in section 508(d) of this title) for such grants for any of the purposes for which funds are made available under section 505 as the Secretary considers most appropriate for carrying out the purposes of this title.

[(B) There is hereby established a supplementary discretionary fund consistent of those amounts to be credited to such fund pursuant to section 505(a) of this title. Amounts in the supplementary discretionary fund shall be distributed by the Secretary in the same manner and for the same purposes as funds distributed pursuant to subparagraph (A) except that (i) such amounts may only be distributed for projects involving construction, reconstruction, or repair begun after the date of enactment of this subparagraph and not to pay for any such work begun before such date, and (ii) the Secretary shall give preference to those projects that increase the safety or capacity of the airport receiving such funds. If any Act of Congress has the effect of limiting or reducing the amount authorized or available to be obligated for any fiscal year for the purposes of section 505, the Secretary shall implement such limitation or reduction by deferring the distribution of a corresponding amount of supplementary discretionary funds until a subsequent fiscal year. In no event may the Secretary reduce any other apportionment or distribution under this section in order to comply with any such Congressional limitation or reduction unless all of the supplementary discretionary funds available for distribution in such year have been deferred until a subsequent fiscal year.

[(4) Notwithstanding any other provision of this subsection, for any fiscal year for which funds are made available under section 505 of this title the Secretary may apportion funds for airports in the State of Alaska in the same manner in which funds were apportioned in fiscal year 1980 under section 15(a) of the Airport and Airway Development Act of 1970. In no event shall the total amount apportioned for such airports under this paragraph for any fiscal year be less than the minimum amounts that were required to be apportioned to such airports in fiscal year 1980 udner section 15(a)(3)(A) of such Act. In no event shall a primary airport be apportioned less under this paragraph for a fiscal year than it would be apportioned for such fiscal year under paragraph (1) of this subsection. In not event shall the amount of funds apportioned under this paragraph which are expended at any commercial service airport in the State of Alaska during a fiscal year exceed 110 percent of the amount apportioned to such airport for such fiscal year. Nothing in this paragraph shall be construed as prohibiting the Secretary from making additional project grants to airports in the State of Alaska from the discretionary fund established in paragraph (3) of this subsection.

[(b) Passengers Enplaned.—For purposes of determining apportionments for any fiscal year under paragraph (1) of subsection (a) of this section, the number of passengers enplaned at an airport shall be based on the number of passenger enplaned at such airport during the preceding calendar year.]

SEC. 507. APPORTIONMENT OF FUNDS.

(a) Apportionment.—On the first day of each fiscal year for which any amount is authorized to be obligated for the purposes of section 505 of this title, the amount made available for the fiscal year under such section and not previously apportioned shall be apportioned by the Secretary as follows:

(1) Primary airports.—To the sponsor of each primary airport, as follows:

(A) $7.80 for each of the first 50,000 passengers enplaned at the airport;

(B) $5.20 for each of the next 50,000 passengers enplaned at the airport;

(C) $2.60 for each of the next 400,000 passengers enplaned at the airport; and

(D) $0.65 for each additional passenger enplaned at the airport.

(2) Cargo service airports.—To the sponsor of each airport which is served by aircraft providing air transportation of only property (including mail) with an aggregate annual landed weight in excess of 500,000,000 pounds, $50,000,000 of the amount made available under section 505 for such fiscal year as follows: In the proportion which the aggregate annual landed weight of all such aircraft landing at each such airport

bears to the total aggregate annual landed weight of all such aircraft landing at all such airports.

(3) STATES.—To the States, 12 percent of the amount made available under section 505 for such fiscal year, as follows:

(A) INSULAR AREAS.—For airports, other than primary airports, 1 percent of such amounts to Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, the Trust Territory of the Pacific Islands, and the Virgin Islands.

(B) STATES.—For airports, other than primary airports and airports described in section 508(d)(3), ½ of the remaining 99 percent in the proportion which the population of each State (other than a State to which subparagraph (A) applies) bears to the total population of all such States and ½ of the remaining 99 percent in the proportion which the area of each such State bears to the total area of all such States.

(b) LIMITATIONS.—

(1) MAXIMUM AND MINIMUM FOR PRIMARY AIRPORTS.—The Secretary shall not apportion less than $300,000 nor more than $16,000,000 under subsection (a)(1) to an airport sponsor for any primary airport for any fiscal year.

(2) LIMITATION ON TOTAL APPORTIONMENTS TO PRIMARY AND CARGO SERVICE AIRPORTS.—

(A) GENERAL RULE.—In no event shall the total amount of all apportionments under subsections (a)(1) and (a)(2) for any fiscal year exceed 48 percent of the amount authorized to be obligated for such fiscal year for the purposes of section 505 of this title.

(B) DISTRIBUTION.—In any case in which apportionments in a fiscal year would be reduced by subparagraph (A), the Secretary shall for such fiscal year reduce the apportionment to each sponsor of an airport under subsections (a)(1) and (a)(2) proportionately so that such 48 percent amount is achieved.

(3) AFFECT OF OBLIGATION CEILING ON PRIMARY AND CARGO SERVICE APPORTIONMENTS.—

(A) OVERALL LIMIT.—If any Act of Congress has the effect of limiting or reducing the amount authorized or available to be obligated for any fiscal year for the purposes of section 505 of this title, the total amount of all apportionments under subsections (a)(1) and (a)(2) for such fiscal year shall not exceed 48 percent of such limited or reduced amount.

(B) DISTRIBUTION.—In any case in which apportionments in a fiscal year would be reduced by subparagraph (A), the Secretary shall for such fiscal year reduce the apportionment to each sponsor of an airport under subsections (a)(1) and (a)(2) proportionately so that such 48 percent amount is achieved.

(4) MAXIMUM PERCENTAGE OF APPORTIONMENTS TO ANY CARGO SERVICE AIRPORT.—The Secretary shall not apportion to the sponsor of any airport more than 8 percent of the total amount of apportionments under subsection (a)(2) for any fiscal year.

(5) TREATMENT OF ALASKA.—

(A) ALTERNATIVE APPORTIONMENT FORMULA.—Notwithstanding any other provision of subsection (a), for any fiscal year for which funds are made available under section 505 of this title the Secretary may apportion funds for airports in the State of Alaska in the same manner in which funds were apportioned in fiscal year 1980 under section 15(a) of the Airport and Airway Development Act of 1970.

(B) MINIMUM APPORTIONMENT.—In no event shall the total amount apportioned for such airports under this paragraph for any fiscal year be less than the minimum amounts that were required to be apportioned to such airports in fiscal year 1980 under section 15(a)(3)(A) of such Act.

(C) HOLD HARMLESS.—In no event shall a primary airport be apportioned less under this paragraph for a fiscal year than it would be apportioned for such fiscal year under subsection (a)(1).

(D) EXPENDITURES AT COMMERCIAL SERVICE AIRPORTS.—In no event shall the amount of funds apportioned under this paragraph which are expended at any commercial service airport in the State of Alaska during a fiscal year exceed 110 percent of the amount apportioned to such airport for such fiscal year.

(E) DISCRETIONARY FUNDING.—Nothing in this paragraph shall be construed as prohibiting the Secretary from making additional project grants to airports in the State of Alaska from the discretionary fund established by subsection (c).

(c) DISCRETIONARY FUND.—

(1) ESTABLISHMENT.—Subject to section 508(d) and paragraph (2) of this subsection any amounts—

(A) which are made available for a fiscal year under section 505,

(B) which have not been previously apportioned by the Secretary, and

(C) which are not apportioned under subsections (a) and (b)(5) of this subsection,

shall constitute a discretionary fund to be distributed at the discretion of the Secretary. Such discretionary fund shall be used for making grants for any of the purposes for which funds are made available under section 505 as the Secretary considers most appropriate for carrying out the purposes of this title.

(2) LEVEL OF FUNDING FOR PRESERVING AND ENHANCING CAPACITY, SAFETY, AND SECURITY.—Subject to section 508(d) and paragraph (4) of this subsection, not less than 75 percent of the funds in the discretionary fund pursuant to paragraph (1) and distributed by the Secretary under this subsection in a fiscal year beginning after September 30, 1987, shall be used for making grants for any of the following purposes: preserving and enhancing capacity, safety, and security at primary airports and reliever airports and carrying out airport noise compatibility planning and programs at primary airports and reliever airports.

(3) SELECTION CRITERIA.—In selecting projects for grants described in paragraph (2), the Secretary shall consider each proposed project's effect on overall national air transportation system capacity, project benefit and cost, and the financial commitment of the airport operator or other non-Federal funding sources to preserve or enhance airport capacity.

(4) LIMITATION.—If the Secretary determines that he will not be able to comply with the percentage requirement established by paragraph (2) in any fiscal year because the number of qualified applications submitted in compliance with this title is insufficient to meet such percentages, the portion of funds which the Secretary determines will not be so distributed shall be available for obligation during such fiscal year without regard to such requirement.

(d) CALENDAR YEAR AS BASIS FOR DETERMINING CERTAIN APPORTIONMENTS.—

(1) PASSENGERS ENPLANED.—For purposes of determining apportionments for any fiscal year under subsection (a)(1), the number of passengers enplaned at an airport shall be based on the number of passengers enplaned at such airport during the preceding calendar year.

(2) LANDED WEIGHT.—For purposes of determining apportionments for any fiscal year under subsection (a)(2), the landed weight of aircraft landing at an airport referred to in subsection (a)(2) shall be based on the landed weight of aircraft landing at such airport and all such airports during the preceding calendar year.

(e) DEFINITIONS.—As used in subsection (a)(3)—

(1) POPULATION.—The term "population" means the population according to the latest decennial census of the United States.

(2) AREA.—The term "area" includes both land and water.

SEC. 508. USE OF APPORTIONED AND DISCRETIONARY FUNDS: MISCELLANEOUS CONDITIONS.

(a) DURATION OF AVAILABILITY OF APPORTIONED AMOUNTS.—Each amount apportioned under **[**paragraph (1), (2), or (4) of section 507(a)**]** *subsection (a) or (b)(5) of section 507* of this title shall be available for obligation under such apportionment during the fiscal year for which it was first authorized to be obligated and the two fiscal years immediately following. Any amount so apportioned which has not been obligated within such time shall be added to the discretionary fund established by section **[**507(a)(3)**]** *507(c)* of this title.

* * * * * * *

(c) STATES.—Funds apportioned to a State under section **[**507(a)(2)**]** *507(a)(3)* shall be available for any of the purposes for which funds are made available under section 505 to airports described in section **[**507(a)(2)**]** *507(a)(3)* which are located in such State. Each sponsor of such an airport may apply to the Secretary for grants from funds apportioned to such State.

* * * * * * *

(d) GENERAL LIMITATIONS.—(1) Not less than 10 percent of the funds made available under section 505 for any fiscal year shall be distributed to reliever airports during such fiscal year.

(2) Not less than [8] *10* percent of the funds made available under section 505 for any fiscal year shall be obligated during such fiscal year [(A)] for airport noise compatibility planning under section 103(b) of the Aviation Safety and Noise Abatement Act of 1979 and for carrying out noise compatibility programs or parts thereof under section 104(c) of such Act[, and (B) in the case of fiscal year 1982, for any of the purposes set forth in section 505(c) of this title].

(3) Not less than 5.5 percent of the funds made available under section 505 for any fiscal year shall be distributed during such fiscal year to—

(A) commercial service airports which are not primary airports,

* * * * * * *

No amounts obligated from the funds apportioned under [paragraph (4) of section 507(a)] *section 507(b)(5)* shall be counted as part of the 5.5 percent required to be distributed under this paragraph for each fiscal year.

(4) Not less than [one] ½ *of 1* percent of the funds made available under section 505 for any fiscal year shall be distributed to planning agencies for the purpose of integrated airport system planning during such fiscal year.

* * * * * * *

(e) USE OF CERTAIN APPORTIONED FUNDS FOR DISCRETIONARY PURPOSES.—(1) Subject to paragraphs (2) and (3), if the Secretary determines, based upon notice provided under section 509(e), or otherwise that any of the amounts apportioned under section [507(a)] *507(a) or (b)(5)* will not be obligated during a fiscal year, the Secretary may obligate during such fiscal year an amount equal to such amounts at his discretion for any of the purposes for which funds are made available under section 505.

* * * * * * *

SEC. 509. SUBMISSION AND APPROVAL OF PROJECT GRANT APPLICATIONS.

(a) SUBMISSION.—(1) * * *

(2) Notwithstanding any provision of this title, the sponsor of any airport may submit a project-grant application for airport development (including noise compatibility projects) to the Secretary within 180 days after the date of enactment of this title, and the Secretary may incur obligations to fund such projects, in accordance with the provisions of this title, from funds available for obligation pursuant to section [507(a),] *507,* if—

(A) a project-grant application or preapplication for such project was submitted to the Secretary before September 30, 1980; or

(B) the project was carried out after September 30, 1980, and before the date of enactment of this title.

* * * * * * *

(e) REQUIREMENT OF NOTICE.—Each sponsor to which funds are apportioned under [section 507(a)(1)] *507(a)(1) or (a)(2)* of this title shall notify the Secretary, by such time and in a form containing such information as the Secretary may prescribe, of the fiscal year in which it intends to apply, by project grant application, for such funds. If a sponsor does not provide such notification, the Secretary may defer approval of any application for such funds until the fiscal year immediately following the fiscal year in which such application is submitted.

* * * * * * *

SEC. 511. PROJECT SPONSORSHIP.

(a) SPONSORSHIP.—As a condition precedent to approval of an airport development project contained in a project grant application submitted under this title, the Secretary shall receive assurances, in writing satisfactory to the Secretary that—

(1) the airport to which the project relates will be available for public use on fair and reasonable terms and without unjust discrimination, including the requirement that (A) each air carrier using such airport (whether as tenant, nontenant, or subtenant of another air carrier tenant) shall be subject to such nondiscriminatory and substantially comparable rates, fees, rentals, and other charges *with respect to facilities directly and substantially related to providing air transportation* and such nondiscriminatory and substantially comparable rules, regulations, and conditions as are applicable to all such air carriers which make similar use of such airport and which utilize similar facilities, subject to reasonable classifications such as tenants or nontenants, [and combined passenager and cargo flights or all cargo flights,] *and signatory carriers and nonsignatory carriers,* and such classification or status as tenant *or signatory* shall not be unreasonably withheld by any airport provided an air carrier assumes obligations substantially similar to those already imposed [on tenant air carriers,] *on air carriers in such classification or status* and (B) each fixed-based operator at any airport shall be subject to the same rates, fees, rentals, and other charges as are uniformly applicable to all other fixed-based operators making the same or similar uses of such airport utilizing the same or similar facilities, and (C) each air carrier using such airport shall have the right to service itself or to use any fixed-base operator that is authorized by the airport or permitted by the airport to serve any air carrier at such airport;

* * * * * * *

(3) the airport and all facilities thereon or connected therewith will be suitably operated and maintained with due regard to climatic and flood conditions , *and any proposal to temporarily close the airport for nonaeronautical purposes must first be approved by the Secretary;*

[(4) the aerial approaches to the airport will be adequately cleared and protected by removing, lowering, relocating, marking, or lighting or otherwise mitigating existing airport hazards and by preventing the establishment or creation of future airport hazards;]

(4) appropriate action will be taken to assure that such terminal airspace as is required to protect instrument and visual operations to the airport (including established minimum flight altitudes) will be adequately cleared and protected by removing, lowering, relocating, marking, or lighting or otherwise mitigating existing airport hazards and by preventing the establishment or creation of future airport hazards;

* * * * * * *

[(12) all revenues generated by the airport, if it is a public airport, will be expended for the capital or operating costs of the airport, the local airport system, or other local facilities which are owned or operated by the owner or operator of the airport and directly related to the actual transportation of passengers or property: *Provided, however,* That if covenants or assurances in debt obligations previously issued by the owner or operator of the airport, or provisions in governing statutes controlling the owner or operator's financing, provide for the use of the revenues from any of the airport owner or operator's facilities, including the airport, to support not only the airport but also the airport owner or operator's general debt obligations or other facilities, then this limitation on the use of all other revenues generated by the airport shall not apply; and]

(12) all revenues (including local taxes on aviation fuel) generated by the airport, if it is a public airport, will be expended for the capital or operating costs of the airport, the local airport system, or other local facilities which are owned or operated by the owner or operator of the airport and directly and substantially related to the actual air transportation of passengers or property; except that if covenants or assurances in debt obligations issued before September 3, 1982, by the owner or operator of the airport, or provisions enacted before September 3, 1982, in the governing statutes controlling the owner or operator's financing, provide for the use of the revenues from any of the airport owner or operator's facilities, including the airport, to support not only the airport but also the airport owner or operator's general debt obligations or other facilities, then this limitation on the use of all other revenues generated by the airport shall not apply;

[(13) the airport operator or owner who receives a grant for the purchase of land for noise compatibility purposes which is conditioned on the disposal of the acquired land at the earliest practicable time will, subject to the retention or reservation of any interest or right therein necessary to insure that such land is used only for purposes which are compatible with the noise levels of the operation of the airport, use its best efforts to so dispose of such land. The proceeds of such dispositions shall be (A) refunded to the United States for the Trust Fund on a basis proportionate to the United States share of the cost of acquisition of such land, or (B) reinvested in an approved project, pursuant to such regulations as the Secretary shall prescribe.]

(13) if the airport operator or owner receives a grant before, on, or after the date of the enactment of this paragraph for the purchase of land for airport noise compatibility purposes—

(A) the owner or operator will, when the land is no longer needed for such purposes, dispose of such land at fair market value at the earliest practicable time;

(B) such disposition will be subject to the retention or reservation of any interest or right therein necessary to ensure that such land will only be used for purposes which are compatible with noise levels associated with the operation of the airport; and

(C) that portion of the proceeds of such disposition which is proportionate to the United States share of the cost of acquisition of such land will, at the discretion of the Secretary—

(i) be paid to the Secretary for deposit in the Trust Fund; or

(ii) be reinvested in an approved noise compatibility project as prescribed by the Secretary;

(14) if the airport operator or owner receives a grant before, on, or after the date of the enactment of this paragraph for the purchase of land for airport purposes (other than noise compatibility purposes)—

(A) the owner or operator will, when the land is no longer needed for airport purposes, dispose of such land at fair market value;

(B) such disposition will be subject to the retention or reservation of any interest or right therein necessary to ensure that such land will only be used for purposes which are compatible with noise levels associated with the operation of the airport; and

(C) that portion of the proceeds of such disposition which is proportionate to the United States share of the cost of acquisition of such land will be paid to the Secretary for deposit in the Trust Fund;

(15) the airport owner or operator will keep up to date at all times a layout plan of the airport which meets the following requirements—

(A) the plan will be in a form prescribed by the Secretary;

(B) before the plan and an amendment, revision, or modification thereof may take effect, the plan, amendment, revision, or modification will be submitted to, and receive approval of, the Secretary;

(C) the owner or operator will not make or permit any changes or alterations in the airport or in any of its facilities which are not in conformity with the airport layout plan as approved by the Secretary or which might, in the opinion of the Secretary, adversely affect the safety, utility, or efficiency of the airport;

(D) if a change or alteration in the airport or its facilities is made which the Secretary determines adversely affects the safety, utility, or efficiency of any federally owned, leased, or funded property on or off the airport, the owner or operator will, if requested by the Secretary—

(i) eliminate such adverse effect in a manner approved by the Secretary; or

(ii) bear all costs of relocating such property (or replacement thereof) to a site acceptable to the Secretary and all costs of restoring such property (or replacement thereof) to the level of safety, utility, efficiency, and cost of operation existing before the unapproved change in the airport or its facilities; and

(16) each contract or subcontract for program management, construction management, planning studies, feasibility studies, architectural services, preliminary engineering, design, engineering, surveying, mapping, or related services with respect to the project will be awarded in the same manner as a contract for architectural and engineering services is negotiated under title IX of the Federal Property Administrative Services Act of 1949 or an equivalent qualifications-based requirement prescribed for or by the sponsor of the airport.

* * * * * * *

(c) CONSULTATION.—In making a decision to undertake any airport development project under this title, each sponsor of an airport [shall undertake reasonable consultations with affected parties using the airport at which such project is proposed.] *"shall undertake, before submission of the project application to the Secretary, reasonable consultations with affected parties using the airport by providing notice and an opportunity for comment by the person designated by each such party to represent such party for such purpose.*

(d) USE OF STATE TAXES ON AVIATION FUEL.—Nothing in subsection (a)(12) of this section shall preclude the use of State taxes on aviation fuel to support a State aviation program or preclude use of airport revenue on or off the airport for noise mitigation purposes.

(e) USE OF LAND DISPOSAL FUNDS.—

(1) AIRPORT NOISE COMPATIBILITY LANDS.—Amounts deposited in the Trust Fund in accordance with subsection (a)(13) of this section shall be available to the Secretary for making grants for airport development and airport planning under section 505(a). Such amounts shall be in addition to amounts made available to the Secretary under section 505 and not subject to the apportionment provisions of sections 507(a) and 507(b)(5).

(2) OTHER AIRPORT LANDS.—Amounts deposited in the Trust Fund in accordance with subsection (a)(14) of this section—

(A) shall be available to the Secretary for—

(i) making grants at the discretion of the Secretary for the purposes described in section 507(c)(2) at primary airports and reliever airports; or

(ii) use in accordance with section 507(a)(3) at other airports in the State in which the land disposition occurred under subsection (a)(14); and

(B) shall be in addition to amounts made available to the Secretary under section 505 and not subject to the apportionment provisions of sections 507(a) and 507(b)(5).

(f) Procedures for Modifying Assurances.—If the Secretary proposes to modify any assurance required of a person receiving a grant under this Act and in effect on or after the date of the enactment of this subsection or proposes to require compliance with any additional assurance from such person, the Secretary shall first—

(1) publish notice of such proposal in the Federal Register, and

(2) provide an opportunity for comment on such proposal.

SEC. 512. GRANT AGREEMENTS.

(a) Offer and Acceptance.—Upon approving a project grant application, the Secretary, on behalf of the United States, shall transmit to the sponsor or sponsors of the application an offer to make a grant for the United States share of allowable project costs. An offer shall be made upon such terms and conditions as the Secretary considers necessary to meet the requirements of this title and any regulations prescribed thereunder. Each offer shall state a definite amount as the maximum obligation of the United States payable from funds authorized by this title, and shall stipulate the obligations to be assumed by the sponsor or sponsors. In any case where the Secretary approves a project grant application for a project which will not be completed in one fiscal year, the offer shall, upon request of the sponsor, provide for the obligation of funds apportioned or to be apportioned to the sponsor pursuant to [section 507(a)(1)] *507(a)(1) or (a)(2)* of this title for such fiscal years (including future fiscal years) as may be necessary to pay the United States share of the cost of such project. If and when an offer is accepted in writing by the sponsor, the offer and acceptance shall comprise an agreement constituting an obligation of the United States and of the sponsor. Unless and until an agreement has been executed, the United States may not pay, nor be obligated to pay, any portion of the costs which have been or may be incurred.

[(b) Maximum Obligation of the United States.—When an offer is accepted in writing by a sponor, the amount stated in the offer as the maximum obligation of the United States may not be increased, except that—

[(1) in the case of any project for airport development (other than a project for land acquisition), the maximum obligation of the United States may be increased by not more than 10 percent; and

[(2) in the case of any acquisition of land or interests in land, the maximum obligation of the United States may be increased by an amount not to exceed 50 percent of the total increase in allowable project costs attributable to such acquisition in land or interests therein, based upon current credible appraisals.]

(b) Maximum Obligation of the United States.—

(1) General rule.—Subject to paragraphs (2) and (3) of this subsection, when an offer is accepted in writing by a sponsor, the amount stated in the offer as the maximum obligation of the United States may not be increased.

(2) Exceptions for fiscal years 1987 and before.—The maximum obligation of the United States under this subsection

with respect to a project receiving assistance under a grant approved under this Act on or before September 30, 1987, may be increased—

(A) by not more than 10 percent in the case of a project for airport development (other than a project for land acquisition);

(B) by an amount not to exceed 50 percent of the total increase in allowable project costs attributable to an acquisition of land or interests in land, based upon current credible appraisals.

Any increase under this section may be paid only from funds recovered by the United States from other grants made under this title.

(3) EXCEPTIONS FOR FISCAL YEARS 1988 AND THEREAFTER.—The maximum obligation of the United States under this subsection with respect to a project receiving assistance under a grant approved after September 30, 1987, may be increased by not more than 15 percent in the case of a project for airport development.

(c) *MAXIMUM OBLIGATION FOR GRANTS UNDER THE AIRPORT AND AIRWAY DEVELOPMENT ACT OF 1970.*—Notwithstanding any other provision of law, in the case of grants made under the Airport and Airway Development Act of 1970 the maximum obligation of the United States may be increased by not more than 10 percent, and any such increase may be paid for only from funds recovered by the United States from other grants made under that Act.

(d) WORKSCOPE.—The Secretary may amend, with the consent of the grant recipient, a grant agreement entered into under this title to change the workscope of a project funded under such grant if such amendment does not result in any increase in the maximum obligation of the United States authorized under subsection (b) of this section.

SEC. 513. PROJECT COSTS.

(a) * * *

(b) TERMINAL DEVELOPMENT.—(1) * * *

(2) Not more than the greater of (A) $200,000 or (B) 60 percent of the sums apportioned under section 507(a)(1) of this title to the sponsor of a primary airport for any fiscal year may be obligated for project costs allowable under paragraph (1) of this subsection. Not more than $200,000 of the sums to be distributed at the discretion of the Secretary under section **[**507(a)(3)**]** *507(c)* for any fiscal year may be used by the sponsor of a commercial service airport which is not a primary airport for project costs allowable under paragraph (1) of this subsection.

* * * * * * *

(4) Sums apportioned under section **[**507(a)**]** *507(a) or (b)(5)* and made available to the sponsor of an air carrier airport (within the meaning of section 11(1) of the Airport and Airway Development Act of 1970, as in effect immediately before the date of enactment of this paragraph) at which terminal development was carried out on or after July 1, 1970, and before July 12, 1976, shall be available, subject to the limitations contained in paragraph (2) of this subsection, for the immediate retirement of the principal of bonds

or other evidences of indebetdness and proceeds of which were used for that part of the terminal development at such airport the cost of which would be allowable under paragraph (1) of this subsection if incurred after the effective date of this paragraph, subject to the following conditions:

* * * * * * *

(c) COSTS NOT ALLOWED.—Except as provided in subsection (b) of this section, the following are not allowable project costs: (1) the cost of construction of that part of an airport development project intended for use as a public parking facility for passenger automobiles; **[**or**]** (2) the cost of construction, alternation, or repair of a hangar or of any part of an airport building except such of those buildings or parts of buildings intended to house facilities or activities directly related to the safety of persons at the airport; *or (3) the cost of decorative landscaping or the provision of installation of sculpture or art works.*

(d) REIMBURSEMENT FOR CERTAIN ADVANCE EXPENDITURES.—

(1) LETTERS OF INTENT.—

(A) ANNOUNCEMENT OF INTENTION.—The Secretary is authorized to announce an intention to obligate for an airport development project (including formulation of the project) at a primary airport or a reliever airport under this subsection through the issuance of a letter of intent to the applicant.

(B) SCHEDULE OF REIMBURSEMENT.—Subject to the provisions of this paragraph, a letter of intent issued under this paragraph shall establish a schedule under which the Secretary will make payments under paragraph (2) of this subsection to the sponsor of the airport at which the airport development project will be carried out.

(C) LIMITATION ON PROJECTS ELIGIBLE FOR ADVANCE FUNDING.—The provisions of this subsection only apply to an airport development project which will be carried out in accordance with all applicable statutory and administrative requirements which would be applicable to the project if the project were being carried out with funds made available under this title and which the Secretary determines will result in a significant enhancement of system-wide airport capacity and meets the criteria of section 507(c)(3).

(D) LIMITATION ON EFFECT.—An action under subparagraph (A) shall not be deemed an obligation of the United States Government under section 1501 of title 31, United States Code, and a letter of intent issued under this paragraph shall not be deemed to be an administrative commitment for funding.

(E) TREATMENT OF LETTER.—A letter of intent under this paragraph shall be regarded as an intention to obligate from future budget authority not to exceed an amount stipulated as the United States share of allowable project costs for the project under this subsection. No obligation or administrative commitment may be made pursuant to such a letter of intent except as funds are provided in authorization and appropriation Acts.

(F) LIMITATIONS ON AGGREGATE AMOUNT.—The total estimated amount of future Federal obligations covered by all outstanding letters of intent under this paragraph shall not exceed the amount authorized to carry out section 505(a), less an amount reasonably estimated by the Secretary to be necessary for grants under section 505(a) which are not covered by a letter of intent.

(2) REIMBURSEMENT.—If the Secretary issues under paragraph (1) a letter of intent to obligate funds for an airport development project (including formulation of the project) at a primary airport or reliever airport and if the sponsor of such airport proceeds with such project without the aid of funds under this title, the Secretary shall pay, as funds become available, the sponsor for the United States share of allowable project costs payable on account of such project in accordance with such letter of intent.

* * * * * * *

SEC. 519. GENERAL POWERS.

(a) GENERAL RULE.—The Secretary is empowered to perform such acts, to conduct such investigations and public hearings, to issue and amend such orders, and to make and amend such regulations and procedures, pursuant to and consistent with the provisions of this title, as the Secretary considers necessary to carry out the provisions of, and to exercise and perform the Secretary's powers and duties, under this title.

(b) LIMITATIONS.—

(1) WITHHOLDING OF APPROVAL.—The Secretary may not withhold approval of a grant application for funds apportioned under sections 507(a)(1), 507(a)(2), and 507(b)(5) for noncompliance with any assurance under this title unless the Secretary provides the applicant with an opportunity for a hearing and the Secretary determines the validity of such noncompliance within 90 days after the date of such application or the date the Secretary first knows of such noncompliance, whichever is later.

(2) WITHHOLDING OF PAYMENT.—The Secretary may not withhold a payment under any grant agreement entered into under this title for more than 60 days after the date such payment is due—

(A) without providing the recipient of such payment with notice and an opportunity for a hearing; and

(B) without determining that the grant recipient has violated such agreement.

* * * * * * *

[SEC. 528. PART-TIME OPERATION OF FLIGHT SERVICE STATIONS.

[(a) Beginning on the date of enactment of this title, the Secretary shall not close or operate on a part-time basis any flight service station except in accordance with this section.

[(b) During the period beginning on the date of enactment of this title and ending on September 30, 1983, the Secretary may provide for the part-time operation of not more than sixty existing flight service stations operated by the Federal Aviation Administration. The operation of a flight service station on a part-time basis shall be subject to the condition that during any period when a flight service station is part-timed, the service provided to airmen with respect to information relating to temperature, dewpoint, barometric pressure, ceiling, visibility, and wind direction and velocity for the area served by such station shall be as good as or better than the service provided when the station is open, and all such service shall be provided either by mechanical device or by contract with another party.

[(c) The Secretary may close not more than five existing flight service stations before October 1, 1983. After October 1, 1983, the Secretary may close additional flight service stations, but only if the service provided to airmen after the closure or such station with respect to information relating to temperature, dewpoint, barometric pressure, ceiling, visibility, and velocity for the area served by such station is as good as or better than the service provided when the station was open and such service is provided either by mechanical device or by contract with another party.**]**

SEC. 528. PART-TIME OPERATION OF FLIGHT SERVICE STATIONS.

On or after the date of the enactment of the Airport and Airway Improvement Amendments of 1987, the Secretary shall not close, or reduce the hours of operation of, any flight service station in any area unless the service provided in such area after the closure of such station or during the hours such station is not in operation will be provided by an automated flight service station with model 1 or better equipment.

SEC. 529. EXPLOSIVE DETECTION K-9 TEAMS.

The Secretary **[**shall**]** *may* provide by grant for the continuation of the Explosive Detection K-9 Team Training Program for the purpose of detecting explosives at airports and aboard aircraft. **[**There is authorized to be appropriated out of the Airport and Airway Trust Fund for purposes of this section not more than $150,000 nor less than $130,000 for each fiscal year after September 30, 1981, and ending before October 1, 1987.**]**

* * * * * * *

AVIATION SAFETY AND NOISE ABATEMENT ACT OF 1979

* * * * * * *

TITLE I

SEC. 101. For purposes of this title—

(1) the term "airport" means any public-use airport (as defined by section **[**503(17)**]** *503(18)* of the Airport and Airway Improvement Act of 1982);

* * * * * * *

SEC. 104. (a) Any airport operator who has submitted a noise exposure map and the related information pursuant to section 103(a)(1) may, after consultation with the officials of any public agencies and planning agencies in the area surrounding such airport, the Federal officials local responsibility for such airport, and any air carriers using such airport *and after notice and an opportunity for a public hearing,* submit a noise compatibility program to the Secretary. Such program shall set forth the measures which such operator has taken or proposes for the reduction of existing noncompatible uses and prevention of the introduction of additional noncompatible uses within the area covered by the noise exposure map submitted by such operator. Such measures may include, but are not limited to—

(1) the implementation of any preferential runway system;

* * * * * * *

(c)(1) The Secretary is authorized to incur obligations to make grants under this Act from funds made available under section 505 of the Airport and Airway Improvement Act of 1982 for any project to carry out a noise compatibility program or parts thereof not disapproved under subsection (b) of this section. Grants under this Act may be made to operators of airports submitting noise compatibility programs and to units of local government in the area surrounding such airports if the Secretary determines such units have the capability to carry out projects for which grant applications are made in accordance with such noise compatibility programs. Such airport operator may in turn agree to make the grant available to public agencies in the area surrounding such airports if the Secretary determines such agencies have the capability to carry out projects for which grant applications are made in accordance with such noise compatibility programs. The Federal share of any project for which a grant is made under this subsection shall be 80 percent of the cost of the project *or the Federal share which would be applicable to such project if the funds made available for such project were being made available under the Airport and Airway Improvement Act of 1982 for a project at the airport, whichever percentage is greater.* All of the provisions of the Airport and Airway Improvement Act of 1982 applicable to project grants made under section 505 of that Act (except section 510 of that Act relating to United States share of project costs) shall be applicable to any grant made under this Act, unless the Secretary determines that any provision of such Act of 1982 is inconsistent with, or unnecessary to carry out, the purposes of this Act.

* * * * * * *

(3) The Secretary is authorized under this section to make grants to operators of airports and to units of local government referred to in paragraph (1) for any project to soundproof any public building used primarily for educational or medical purposes if, before the date of the enactment of this paragraph, such building was listed as being adversely affected by airport noise in a final environmental impact statement published by the Federal Aviation Administration.

* * * * * * *

Section 334 of Title 49, United States Code

§ 334. Limit on aviation charges

The Secretary of Transportation may impose a charge for an approval, test, authorization, certificate, permit, registration, transfer, or rating related to aviation that has not been approved by Congress only when the charge (1) was in effect on January 1, 1973, and (2) is not more than the charge that was in effect on that date, *adjusted in proportion to changes in the Consumer Price Index for All Urban Consumers published by the Bureau of Labor Statistics of the Department of Labor between January 1, 1973, and the date the charge is imposed.* However, this section does not apply to a charge for a test, authorization, certificate, permit, or rating related to an airman or repair station administered or issued outside of the United States, as defined in section 101(41) of the Federal Aviation Act of 1958 (49 App. U.S.C. 1301(41)).

IX. CONGRESSIONAL BUDGET ACT INFORMATION

No information pursuant to section 308(a) of the Congressional Budget Act of 1974 has been provided to the Committee by the Congressional Budget Office. Under a separate section of this report, a five year current programs cost estimate is provided in response to a requirement of section 308(a). No funds for state or local financial assistance are included in H.R. 2310 Section 2(b).

X. CONGRESSIONAL BUDGET OFFICE COST ESTIMATE

1. Bill number: Section 2(b) of H.R. 2310.

2. Bill title: Airport and Airway Improvement Amendments of 1987.

3. Bill status: As ordered reported by the House Committee on Science, Space and Technology, May 20, 1987.

4. Bill purpose: The section would provide a two-year authorization (1988 and 1989) for the research, engineering and development program funded by the Airport and Airway Trust Fund. In addition, the section would require annual reports demonstrating that funds were expended as required under the section.

5. Estimated cost to the Federal Government: The section authorizes appropriations from the trust fund for the research, engineering and development program, as shown in the following table.

[By fiscal year, in millions of dollars]

	1988	1989	1990	1991	1992
Authorization level	201	215			
Estimated outlays	131	180	63	31	11

Based on information from the Department of Transportation, CBO estimates that the required reports would not have a significant budgetary impact.

The costs of this section would fall in budget function 400.

Basis of estimate: CBO assumes that the funds authorized will be appropriated prior to the beginning of each fiscal year. Outlays are based on historical spending rates.

6. Estimated cost to State and local governments: None.
7. Estimate comparison: None.
8. Previous CBO estimate: None.
9. Estimate prepared by: Mitchell Rosenfeld.
10. Estimate approved by: C.G. Nuckols for James L. Blum, Assistant Director for Budget Analysis.

XI. OVERSIGHT FINDINGS AND RECOMMENDATIONS COMMITTEE ON GOVERNMENT OPERATIONS

No findings or recommendations on oversight l activity pursuant to clause 2(b)(2), rule X and clause 2(1)(3)(D), rule XI, of the Rules of the House of Representatives have been submitted by the Committee on Government Operations for inclusion in this report.

XII. COMMITTEE RECOMMENDATION

A quorum being present; the Committee unanimously approved the bill as amended by voice vote a quorum being present.

XIII. FAA RECOMMENDATION

This is a Federal Aviation Administration item which falls within the jurisdiction of this Committee pursuant to rule X, clause 1(r)(9) of the Rules of the House of Representatives. This Committee chose to increase its authorization over the request from the Administration as proposed by the Office of Management and Budget as indicated by the following letter:

THE SECRETARY OF TRANSPORTATION,
Washington, DC, February 12, 1987.

Hon. JIM WRIGHT,
Speaker of the House of Representatives,
Washington, DC.

DEAR MR. SPEAKER: Enclosed for introduction and referral to the appropriate Committee is a draft bill entitled the "Airport and Airway Enhancement Act of 1987."

The proposed legislation fulfills one of this Administration's high priorities for the Federal Government—a national aviation system which is as safe and efficient as possible, meeting the needs of the Nation's travelers and commerce, but carried out with innovative techniques that offer state governments and airport operators options to expand their influence over development activities.

The President's Fiscal Year 1988 Budget, reflected in this legislation, would increase aviation safety, security, and capacity enhancement funding by about 20 percent over current levels. This strong commitment to aviation excellence deserves the earliest consideration and action by the Congress.

This proposal provides for steady increases in the levels of air traffic controllers and safety inspectors so critical to the growing air traffic, safety certification, and inspection responsibilities of the Federal Aviation Administration (FAA). We believe these increases are necessary given the stimulus of domestic airline deregulation to both traffic levels and the appearance of new entrants and shifting maintenance arrangements. In any case, air traffic management will continue to assure maximum safety under any new funding or personnel levels.

Proposed funding levels in the bill will provide for the hardware expenditures needed to maintain momentum of the National Airspace System (NAS) Plan proposed by the Administration in 1981 and adopted by Congress in 1982. The NAS Plan will provide important gains in reliability and capacity for the air navigation system, and will produce added benefits in the detection of windshear and microburst weather phenomena that threaten airport approach and departure. With the advice of the Systems Engineering Integration contractor, we have also proposed a $200,000,000 additional authorization for use in the event of unforeseen costs associated with fulfillment of the projected Plan. This authorization would be separate from the basic program level and would not be tapped unless unforeseen factors lead to increased cost.

Several major innovations are proposed for the airport development and planning grant program—in each case to make possible more productive use of grant funds for the most important objectives for the aviation system overall. While the NAS Plan will significantly increase airspace capacity, we now face increasing airport congestion and delay that must be addressed in a more coordinated fashion than in the past to maintain the high efficiency and convenience we have come to assume. The legislation relaxes the inflexible categories and set-asides found in the current apportionment of airport grant funds, so that funds can be directed to the projects with the most potential for enhancing overall system capacity, along with the most needed safety and security enhancements.

Two other innovations will increase productivity of funds. States meeting minimum FAA standards can elect to receive their share of the 22 percent state formula funds as a "block grant." We believe that states which exericise this option will more effectively prioritize the sequence of development projects needed primarily to meet local requirements.

The second voluntary option permits airport operators with formula entitlement rights, large or small, to forego that entitlement in favor of imposing their own "passenger facility charge" or PFC. Currently the PFC is prohibited by section 1113 of the Federal Aviation Act of 1958, as amended. We propose that the prohibition be lifted in the case of an individual airport that chooses to finance its own development independent of the Federal grant program. The only limitation on such PFC's would be that all proceeds be expended for airport-related purposes. While existing Federal assurances, associated with past grant project assistance would remain in place, few Federal requirements would be imposed on development not involving Federal funds. Because only a small proportion of the most major airports would likely choose this option in the first 2 years, we do not propose an immediate adjustment of Federal user fees.

The legislation authorizes appropriations from the Airport and Airway Trust Fund for FAA Operations up to a level that achieves an overall 85-percent recovery of FAA expenditures from the Trust Fund. It remains the case that only about 15 percent of FAA service are provided to public and military aircraft operations. Other users can and should pay their share of costs for operating and maintaining the system. Accordingly, the balance of funding should come from the use fees deposited in the Trust Fund for this purpose. The current high balances in the Trust Fund exist in large part because an unjustifiable low proportion of the FAA's operational expenses have been authorized from the Trust Fund in the past. Under this proposal, resources will be preserved for significant long-term capital needs which will remain at the end of the 2-year authorization period regardless of what organizational form FAA functions are peformed under in the long term.

The Airport and Airway Trust Fund and supporting user fees would be extended without change.

We feel strongly that this proposal meets the aviation needs of our Nation, and we look forward to working with the Congress toward its enactment. The Office of Management and Budget advises that, from the standpoint of the Administration's program, there is no objection to the submission of this bill for the consideration of Congress, and its enactment would be in accord with the program of the President.

Sincerely,

ELIZABETH HANFORD DOLE.

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